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This periodical is published to inform air pollution personnel of the Environmental Protection Agency (EPA), and others, of technical literature recently accessioned by the Air Pollution Technical Information Center (APTIC). For each accession, its Abstract Number, APTIC accession number, bibliographic citation, and abstract are given. Translations are cited with their sources whenever possible. The subject fields are as follow: Emission Sources; Control Methods; Measurement Methods; Air Quality Measurements; Atmospheric Interactions; Basic Science and Technology; Effects-Human Health; Effects-Plants and Livestock; Effects-Materials; Economic Aspects; Standards and Criteria; Legal and Administrative; Social Aspects; and General and Miscellaneous. All abstracts are listed under one of the above subject fields. A subject and author index are included. This issue contains abstracts 20975 - 21918.

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AIR POLLUTION ABSTRACTS

Vol. 3, No. 8 August 1972

Prepared by:
Air Pollution Technical Information Center (APTIC)
Research Triangle Park, North Carolina 27711

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INTRODUCTION

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The serial publications (journals, periodicals, etc.) which are regularly screened for input are listed with their publishers' addresses in one issue in each volume of our abstract bulletin; the most recent list appeared in the December 1971 issue.

As another service, abstracts of all of the literature in APTIC (not just in a single issue of this periodical) on any subject related to air pollution will be provided free of charge upon request. APTIC can search information more recent than that in the current issue of this periodical because of lapse of time entailed by editorial, make-up, and printing work. More than 1400 subject index terms are available for such searching—more than those included in the subject index in each issue.

SUBJECT FIELDS AND SCOPE NOTES

1. EMISSION SOURCES

Information pertaining to an industry, process, or material associated with air pollution. Documents in this category are concerned primarily with characteristics of a specific class of emission sources including types, rates, industries; secondary coverage may include effects, control methods, etc.

2. CONTROL METHODS

Includes equipment and both specific source control and general abatement efforts. Included are documents describing the operating principles, design, operation, efficiency, etc., of equipment and methods of removing pollutants. The scope of the document can vary from a device for a specific source to an approach applicable to an entire industry– e.g., automobiles.

3. MEASUREMENT METHODS

Includes equipment as well as methods. Confined to development, testing and evaluation of pollutant determination methods (sampling, analytical, monitoring) and equipment, as such. Data obtained by use of methods in specific applications are placed in the applicable subject categories.

4. AIR QUALITY MEASUREMENTS

Pollution measurements in the ambient air, generally related to specific geographical locations, such as area surveys. Also includes general reviews of area situations and emission source inventories.

5. ATMOSPHERIC INTERACTION

All chemical and physical phenomena occurring in the atmosphere. Included is material on dispersion, air pollution forecasts, meteorological effects, topographical effects, photochemical reactions in the atmosphere, etc. Laboratory studies of photochemical reactions are assigned to Basic Science and Technology.

6. BASIC SCIENCE AND TECHNOLOGY

General discussions or data compilations for the basic physical and chemical properties of pollutants. Theoretical and laboratory studies on related chemical and biological reactions and mechanisms. Mass transfer and other basic knowledge related to process engineering applications in emission control or abatement. Excludes photochemical studies in the atmosphere and biochemical studies related to effects of air pollution.

7. **EFFECTS–HUMAN HEALTH**

Covers medical and epedemiological studies; biological effects other than those on plants and livestock produced by air pollutants; laboratory animal experiments.

8. **EFFECTS–PLANTS AND LIVESTOCK**

Effects on vegetation–crops, trees, other plants–and on livestock as distinguished from laboratory experimental animals.

9. **EFFECTS–MATERIALS**

Deterioration, corrosion, etc., of physical materials, buildings, and structures.

10. **ECONOMIC ASPECTS**

Economic implications of air pollution and its control, e.g., economic losses from pollution damage, and costs of control programs or equipment in general.

11. **STANDARDS AND CRITERIA**

Recommended or adopted guides, criteria and standards for allowable emission limits or pollutant concentrations, air quality. equipment characteristics, and fuels.

12. **LEGAL AND ADMINISTRATIVE**

Legal aspects include legislation, ordinances, rules, litigation, hearings, decisions, etc. Administration covers administrative and miscellaneous information concerning control agencies and control and research programs. Typical topics are personnel, budgets, contractural activities and program descriptions.

13. **SOCIAL ASPECTS**

Sociological and psychological aspects such as social attitudes, public opinion studies, public relations, and public information.

14. **GENERAL AND MISCELLANEOUS**

Reviews of general problems, trends and background. Documents not assignable to other categories.

ABSTRACT BULLETIN

EMISSION SOURCES

20975 APTIC NO. 40038

Osaka Prefectural Government (Japan)

WHITE PAPER ON PUBLIC NUISANCE, 1971 EDITION. *(Kogai hakusho, Showa 46-nen ban). Text in Japanese. 315 p., 1971.*

The pollution in Osaka Prefecture, including the present situation and control plan, were described. Approximately 7,000,000 kl of heavy oil, 2,000,000 tons of coal, and 2,500,000 tons of coke were consumed during the year of 1969. Heavy oil was estimated to increase to 8,000,000 kl, and coal to decrease to 1,000,000 tons, while coke would remain unchanged in the next year. The sulfur dioxide discharged in 1969 was 314,000 tons, and it is expected to decline to 295,000 tons in 1970. This was due to the decrease of sulfur content from 1.94% to about 1.73%. There were 1,336,539 registered automobiles at the end of 1970. The measurement of sulfur oxide concentrations by the lead dioxide method revealed that it was as high as 1.78 mg/day/100 sq cm at the west bank industrial area of Osaka city. The monthly average concentration of carbon monoxide was 2.6 ppm, that of nitrogen dioxide 0.057 ppm, and that of oxidants 0.026 ppm. Thirteen categories of facilities were included in the pollution control regulations as polluters and required control. There were 28 observation stations for various purposes, including two observation cars for the detection of automotive exhaust gas. The blue-sky plan was described.

20976 APTIC NO. 40040

RESOURCE RECYCLING AND ENVIRONMENTAL CONTROL IN CHEMICAL INDUSTRY. *(Kagaku kogyo ni okeru shigen to kankyo seigyo). Text in Japanese. Kagaku Kogaku (Chem. Eng.), 36(4):356-365, April 1972. 10 refs.*

At the Kanto district in Japan 550,000 tons of sulfur compounds were discharged in 1968. About 1,310,000 tons in 1975 are estimated. The gross product would increase 2.1 times, investment on pollution control would increase 4.7 times, and the removal rate would increase from 9% to 21%. However, the pollution would increase 2.07 times and 1/4 of the pollution would be caused by chemical industries. Increasing the removal rate to 50% would cause an average cost increase of 2.3%, and 2.1% for chemical industries. In 1969, 33,000,000 kl of petroleum and 22,000,000 tons of coal were consumed and 1,500,000 tons of sulfur dioxide and 160,000 tons of particulates were discharged in Japan. The production of pollution control apparatus increased 153% from 1968 to 1969, whereas the flue gas treating apparatus increased seven times. Among 56 chemistry-related academic associations, only 10 were actively devoted to environmental studies.

20977 APTIC NO. 40112

National Industrial Pollution Control Council, Washington, D. C., Dairy, Fish and Other Foods Sub-Council

POLLUTION PROBLEMS IN SELECTED FOOD INDUSTRIES. *30p., May 1971. 31 refs.*

GPO: 437-388/2

The food processing industries (excluding meat, poultry, and grain-based foods) do not have serious air pollution problems nor are they a major source of such pollution. Particulate matter of low specific gravity from dusty materials, objectionable odors, and smoke and particulates from burning non-usable solids such as hulls are the main pollutants. Another major problem is public misunderstanding that steam plumes constitute an air pollution problem. Water pollution, noise, thermal pollution, and solid waste disposal are discussed. Improvements in monitoring and control are mentioned. Economic and legal factors are also discussed.

20978 APTIC NO. 40180

Kearney (A. T.) and Co., Inc., Chicago, Ill.

AIR POLLUTION ASPECTS OF THE IRON FOUNDRY INDUSTRY. *Office of Air Programs Contract CPA 22-69-106, Rept. APTD-0806, 260p., Feb. 1971. 18 refs.*

A study directed at the iron foundry industry, with particular emphasis on the melting area, was undertaken in order to examine those aspects pertinent to air pollution. Pollutants commonly discharged by such industries include smoke, metallic oxides, oil vapors, carbon monoxide, sand fines, metal dust, and coke dust, odors, fluoride fumes, vapors, and facing fumes. Particulate emissions have been a point of focus for concentrated efforts in air pollution; however, gaseous emissions and odors from the foundries have not been given much attention, and the foundry industry now has to take steps to suppress these discharges into the atmosphere. The physical difficulties of satisfactory collection of pollutants are not easily solved and, in most cases, costs of satisfactory collection are quite high. A lack of correlation between standard furnace design factors and emission levels indicates a variance in operating factors. One group of variables is related directly to cupola operation, including specific blast rate, blast temperature, type of lining, and operating variables of the afterburner. A second group of variables concerns the quantity and quality of charge materials. Reproducibility of test results is difficult with any given technique, even for a stable emissions producing system. Compounded further by the use of different techniques, equipment, and testing companies to obtain data for comparison and analysis, the confidence level of the data must suffer, despite the high degree of professionalism of the laboratories performing the tests. Control methods include centrifuges, scrubbers, filters, afterburners, preheaters, hoods, and electrostatic precipitators.

20979 APTIC NO. 40248

CARS POLLUTING YOUR AIR? REFRIGERANT MAY BE THE ANSWER. *Refrigeration Service Contracting, 39(9):34-36, Sept. 1971.*

A new steam-like engine system, using a refrigerant liquid, R-113, as a propellant, produces a virtually pollution-free exhaust. The engine basically consists of a heat exchanger, drive motor, condenser, and pump. Fuel burners, fed by a pump and an air blower, provide heat to operate the heat exchanger. The fuel may be any hydrocarbon fuel such as kerosene, fuel oil, or gasoline. Kerosene is the fuel used in the current prototype. The drive motor is a cross between a piston engine and a turbine. At slow speed it behaves like a steam piston engine; i.e., it develops full torque at zero rpm. However, at some higher speed it begins to take on the characteristics of an impulse turbine, and the torque remains constant as speed increases. The exhaust is more than 200 times cleaner than that required by 1980 H.E.W. standards. This is accomplished by burning the fuel as an open, steady flame with extra air supplied to keep carbon monoxide down to a breathable level. Nitrogen oxides are not formed since the burning occurs at atmospheric pressure and combustion gas is recirculated and cooled slowly. Mass produced automobiles using this engine system are expected to be less expensive by a couple of hundred dollars than a comparable car today. Gas mileage, using kerosene, should be about the same as for a new 1965 (pre-smog control) auto. The physical nature of this engine system will limit its use to new automobiles. Old autos could be rebuilt, but the cost would be more than triple that of a new car.

20980 APTIC NO. 40256

MERCEDES BENZ REFUSE VEHICLE WITH TEST GAS ENGINES FOR MUNICH. *(Mercedes-Benz Muellwagen mit Versuchs-Gasmotoren fuer Muenchen). Text in German. Staedthygiene (Uelzen/Hamburg), 23(4):14, 1972.*

A refuse collection vehicle to be delivered to the city of Munich has been designed for operation with liquid propane and a test vehicle fueled by natural gas will be studied in long-term tests. Disadvantages of the gas-driven engine are its higher energy consumption and the high price of liquid gas. However, exhaust gas emissions of Diesel engines have been reduced considerably in the past and are now nearly as low as those of gas-driven engines.

20981 APTIC NO. 40257

SUPERVISION OF HEATING PLANTS? (Ueberwachung von Heizungsanlagen). Text in German. R.A.S./Rohr-Armatur-Sanitaer- Heinzung), no. 5:208, May 1972.

Domestic heating emissions comprise 6% of total air pollutants emitted in the Federal Republic of Germany; traffic, 60%; industry, 18%; power plants, 13%; and other sources, 3%. Oil burners should be regularly controlled in order to reduce air pollution, but on the whole the pollution resulting from light fuel is very small because the sulfur of the fuel can be reduced to 0.4%.

20982 APTIC NO. 40357

REFUSE MELTING PLANT REMOVES INDUSTRIAL AND DOMESTIC REFUSE. *(Muellhuette beseitigt industrie- und Hausmuell). Text in German. Umwelt (Duesseldorf), 2(2):54, April, 1972.*

An arc furnace has been tested for use in melting domestic and industrial refuse. Similar to the process in a blast furnace, the refuse is submitted to metallurgical reduction at temperatures of 1500 to 1700 C, during which all organic compounds and bacteria are destroyed. The final solid products are a ferrous metal which can be used in oxygen converters, and refuse slag which is usable as an additive in road construction. Process gases are cleaned of dust, vapors, and acids and are then used for the production of energy and heat. The application of this refuse melting process contributes significantly to the solution of environmental problems by recycling the refuse.

20983 APTIC NO. 40427

A PANEL DISCUSSION ON PUBLIC NUISANCE AND ANALYTICAL CHEMISTRY. NO. 3 ON NITROGEN OXIDES. *(Kogai to bunseki kagaku ni kansuru paneru toronkai. Daisankai chisso sankabutsu). Text in Japanese. Bunseki Kagaku (Japan Analyst), (Tokyo), 21(3):458-469, March 1972. 16 refs.*

The known nitrogen oxides includes nitrous oxide, nitric oxide, nitrogen dioxide, nitrous anhydride, and nitric anhydride. Among them, nitrogen dioxide, which exists partly as nitrogen tetraoxide (N2O4), is known its toxicity to the human body, whereas the toxic action of N2O3 is unknown. According to statistical data from Los Angeles, 60% of the nitrogen oxides in air are from automotive exhaust gas, while 35% are from stack gas. The NO combines with hemoglobin in blood, and 4500 ppm of NO causes acute intoxication. Inhalation of 100 ppm of NO2 for 60 min or 400 ppm for 5 min causes death. The tolerance concentration proposed by the Japan Production Health Association is 5 ppm for NO2, 10 ppm for nitric acid, and that proposed by ACGIH is 25 ppm for NO, 5 ppm for NO2, and 2 ppm for HNO3. In a laboratory, NO and NO2 can be removed as ammonium nitrate, lead nitrate, or sodium nitrate, and the JIS ethylenediamine method is used for the analysis. The oxidation of NO to NO2 is necessary for the colorimetric analysis of NOx by the Saltzman method. Oxidation coefficients were determined using a potassium permanganate sulfuric acid solution as the oxidizing agent. Results showed that the relative humidity had a significant effect on solid oxidants. Addition of sulfuric acid in an electrolyte for NO cathodic oxidation increased the oxidizing power. A Saltzman coefficient of 0.72 was calculated by the colorimetric method. The analytical methods for NOx in exhaust gas and the problems were also discussed.

20984 APTIC NO. 40442

POLLUTION-FREE AUTOMOBILE. *Natl. Eng., 5(5):9, April 1972.*

An experimental passenger car, powered by a turbine engine has been delivered to the City of New York's Department of Air Resources for testing. The turbine car is powered by a small, lightweight 80 hp low emission gas turbine engine which will be tested over a 2-year period during which vehicle exhausts will be analyzed for the presence of such pollutants as unburned hydrocarbons, carbon monoxide, nitric acid, and nitrogen dioxide. The engine itself measures 24 inches long, 26 inches wide, and 16 inches high and weighs 250 lbs. It has only a fourth as many moving parts as an internal (combustion engine, is smoother and quieter and requires less maintenance with no conventional tuneup. There is no radiator; the engine is self-cooled. There are no pistons and only a single spark plug. It can operate on a variety of fuels, including unleaded gas. This new engine incorporates two rotary heat exchangers to provide fuel economy and to cool the exhaust. Unburned fuel is eliminated from the turbine engine exhaust because of excess air available in the gas turbine combustion process. Measurements on the Williams Research engine indicate low levels of unburned hydrocarbons, carbon monoxide, and oxides of nitrogen. It is anticipated, however, that further refinements will be necessary to meet the strict 1976 desired levels for oxides of nitrogen.

20985 APTIC NO. 40448

NATURAL GAS ENGINE FOR BUSES MEETS 1975 EMISSION LIMITS. *Automotive Eng., 80(6):28-29, June 1972.*

An experimental Mercedes-Benz natural gas engine for city buses requires 15% more fuel than a comparable diesel engine, but has low emissions and low noise. The emission levels of 2 g/bhp-hr for carbon monoxide and 3.8 g/bhp-hr for hydrocarbons plus nitrogen oxides are well below the 1975 California limits of 25 and 5 g/bhp-hr, respectively. The rear-mounted horizontal 6-cylinder in-line spark-ignition engine has a bore of 125 mm, a stroke of 150 mm, and a compression ratio of 11/1. Maximum output is 190 bhp (SAE) at 2200 rpm. The engine and its new liquid natural gas system are illustrated.

20986 APTIC NO. 40478

PROPANE: A NEW MARKET FOR AN OLD FUEL. *Can. Petrol., 13(5):45-47, May 1972.*

The discovery that gasoline fumes and gasoline combustion products are one of the main causes of air pollution, especially smog, has led to an intensive search for alternate fuels for the internal combustion engine. One of the most promising alternates is propane. Propane, in a properly adjusted engine, produces a considerably smaller amount of hydrocarbons carbon monoxide, and nitrogen oxides than gasoline used in the same engine. The hydrocarbons emitted by the combustion of propane are far less reactive than those emitted by the combustion or evaporation of gasoline, and are therefore much less able to produce smog. Engines run on propane, on the average, can go twice as far between overhauls as the same engine run on gasoline. Also, with propane transport and storage, losses due to evaporation and pilferage are drastically reduced. The costs of gasoline and propane to a motor vehicle operator differ according to regional taxation, but generally lie within 1 cent/gal of each other and are comparable. For the conversion of a gasoline-powered vehicle to propane fueling, the entire gasoline supply system from the fuel tank to the intake manifold of the engine is removed. A propane system, consisting of a pressurized tank, filter and lock-off valve, converter, and carburetor is installed. The cost of this conversion amounts to about $500. An important factor in any conversion from gasoline to propane is driver and mechanic education.

20987 APTIC NO. 40575

National Society for Clean Air, London (England), Technical Committee

SO2. SULFUR DIOXIDE. AN AIR POLLUTANT. *24p., 1971. 17 refs.*

The present status of sulfur dioxide pollution in Great Britain is reviewed. Most SO2 emitted in Britain orgniates from the combustion of fuels, particularly bituminous coal and heavy fuel oil. Urban SO2 concentrations have been falling steadily for 10-15 yr and now the average is 100 micrograms/cu m or less. If a further reduction is desired, action should be taken on a local rather than a national basis. The action should be directed at solid fuel consumption in domestic houses and heavy fuel consumption in commercial and public buildings. These sources generate, respectively, 50% and 25% of low level SO2 emission. Although 5 million tons/yr SO2 are emitted from medium or tall industrial and power station chimmeys, these emissions contribute very little to general urban SO2 pollution. Practical measures for reducing SO2 emissions include augmenting supplies of low sulfur fuel; removing sulfur from fuel before combustion; and removing SO2 from flue gases. The costs of these measures must be weighed against the benefits to be derived. Selective controls applied only fuels and emission sources primarily responsible for pollution may be the most practical answer. In additon to studies of control methods, further research is needed to define SO2 levels that are harmful to public health, crops, and building materials.

20988 APTIC NO. 40768

Havens and Emerson, Cleveland, Ohio

PRELIMINARY DESIGN REPORT ON INCINERATION OF GRIT, SCREENINGS, AND SCUM FOR THE METROPOLITAN SANITARY DISTRICT OF GREATER CHICAGO. *143p., Feb. 1969.*

The feasibility of incinerating waste grit, screenings, and scum from eight Chicago Sanitary District treatment works in a single incinerator was studied. The quantity of waste materials produced was determined, and the quantity expected in 1985 was estimated. On the peak operating day in 1985, the incinerator will receive 250 tons of combined waste solids for incineration. A detailed study of the chemical and physical characteristics of the feed material indicated that the wet combined feed as received will be relatively dry and high in combustible content, with substantial heat value. The material is capable of self-sustaining combustion and will produce considerable excess heat. Containerized trucking is the most economical transportation system from the remote treatment works, and facilities for material storage will be required at the incinerator site to reduce the peak capacity of the incinerator and to provide for thawing of frozen materials during winter. A total storage capacity of about 900 cu yds is recommended. Various types of conveyor equipment were examined or tested for handling of these difficult materials; the preferred conveying systems include belt conveyors on horizontal runs or moderate inclines. Detailed combustion analyses were made. Based on many types of incinerators, the multiple hearth incinerator and the fluidized bed reactor meet the desired design and operating criteria better than all other types. Air pollution control requirements were examined. The system should be capable of exceeding the requirements of existing codes and regulations. Recommended control equipment includes a re-heat chamber with afterburners, a pre-cooler and wet scrubber of the impingement tray or venturi type, an induced draft fan, and a 125-foot chimney. Facilities for reducing the steam plume in winter can be added. Construction cost is estimated at $2,631,000, including allowances for cost escalation to 1970.

20989 APTIC NO. 40792

Aaronson, Allen E. and Richard A. Matula

DIESEL ODOR AND THE FORMATION OF AROMATIC HYDROCARBONS DURING THE HETEROGENEOUS COMBUSTION OF PURE CETANE IN A SINGLE-CYLINDER DIESEL ENGINE. *Combustion Inst., Pittsburgh, Pa., Symp. (Int.) Combust., (Proc.), 13th, Salt Lake City, Utah, 1970, p. 471-481. 13 refs. (Aug. 23-29.)*

Experimental facilities and methods, based on combined gas chromatographic and mass spectrometric techniques, which can be employed for the qualitative analysis of odoriferous and carcinogenic compounds formed during the heterogeneous combustion of pure hydrocarbon fuels are described. Exhaust gas samples from a lightly loaded CFR diesel engine operating on a lean, pure cetane-air mixture at a compression ratio of 14 to 1 were collected and analyzed. A number of species including saturated and unsaturated aldehydes, alcohols, and acids, both homo and heterocyclic compounds, and aromatic compounds were qualitatively identified. The significance of these results is discussed in conjunction with both the diesel-odor problem and the possible biological activity of diesel exhaust. Since commercial lubricating oil contains significant quantities of cyclic compounds, the pyrolysis and partial oxidation of any oil blow-by was investigated as a possible source of the aromatics. Additional engine experiments showed that aromatics were still present in the exhaust when the commercial oil was replaced by an oil that did not contain any cyclic compounds. The combustion products of pure cetane-air mixtures burning at atmospheric pressure, in an air- aspiring spray burner, were also found to contain aromatic hydrocarbons. Based on these experiments, it appears that a large number of aromatic hydrocarbons are synthesized during the heterogeneous combustion of pure cetane-air mixtures, and that any blow-by of lubricating oil that occurs in a diesel engine enhances the production of aromatic hydrocarbons. (Author abstract modified)

20990 APTIC NO. 40577

Armistead, George, Jr.

REFINERY LOSSES. . . WHERE THEY ARE, AND HOW TO REDUCE THEM. *Oil Gas J., 45(10):108-111, July 13, 1946. 8 refs.*

The principal avenues for escape of petroleum during refinery processing are evaporation and other escape into the atmosphere, loss through plant-water effluent, soil leakage, and miscellaneous losses such as incomplete tank car emptying. The weight balance is illustrated as the chief available tool for investigating and identifying refinery losses. The causes and control of loss from unloading and loading operations, line and vessel leaks, condensing and cooling equipment, tank storage, and processing are discussed. The principal factors affecting losses from atmospheric storage tanks, an important source of evaporative loss, are vapor pressure of the tank liquid, frequency of emptying and filling, average oil level, and atmospheric conditions including wind speed and daily temperature differentials. Floating-roof tanks are subject to minimum evaporation and ordinary cone-roof tanks to the greatest evaporation. In hot climates, water cooling of tank elements may be justified.

20991 APTIC NO. 40556

Ayres, Robert and Roy A. Renner

AUTOMOTIVE EMISSION CONTROL: ALTERNATIVES TO THE INTERNAL COMBUSTION ENGINE. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 39p., 1970. 20 refs. (Presented at the Air Pollution Control Association, West Coast Section, Technical Meeting, 5th, San Francisco, Calif., Oct. 8-9, 1970.)*

Alternative forms of automotive power were examined in terms of reduced environmental pollution, and in terms of long-term costs to the owner. Power systems evaluated include gas turbine, diesel, Rankine cycle (steam or other vapors), battery electric Stirling, electric, and hybrid systems. Hypothetical projections are necessary in such a comparison, since few of these systems are tried in high-evolved or mass-produced forms. Even though all alternatives appear higher in first cost than the present spark-ignition internal combustion engine, some examples may have compensating reduction in long-term operating and maintenance costs. Future development in the Rankine engine may allow an actual cost saving, while at the same time exceeding the projected 1980 requirements for emission control. Emissions of hydrocarbons, carbon monoxide, nitrogen oxides, and evaporative hydrocarbons are given for each system. (Author abstract modified)

20992 APTIC NO. 40289

Bakke, Keith A

FARGO-MOORHEAD AIR POLLUTANT EMISSION INVENTORY. *National Air Pollution Control Administration, Durham, N. C., Air Quality and Emission Data Div, Office of Air Programs, Pub-APTD-0816, 56p., March 1970. 6 refs.*

NTIS: PB 207690

Sulfur oxides, particulates, carbon monoxide, hydrocarbons, and nitrogen oxides are delineated with respect to source type, season of the year, and geographical distribution within the area of Fargo-Moorehead, North Dakota. The general procedure for the survey was based on the rapid survey technique for estimating air pollutant emissions. The largest portion of the sulfur oxides emitted in the study area came from three individual sources which together consumed 97% of the coal utilized in the area. Fifty feed and grain elevators and the three large coal users were the major contributors to particulate emissions. Motor vehicles contributed 86% of the carbon monoxide emitted annually. The three largest sources of the 11,100 tons of hydrocarbons were motor vehicles, automobile evaporation losses, and the storage and handling of gasoline. Stationary fuel combustion and transportation sources accounted for nearly 100% of the emissions of nitrogen oxides.

20993 APTIC NO. 40683

Baryshev, V. I.

THE COMPOSITION OF FUEL RESIDUES CONTAINED IN THE FLUE GASES FROM THERMAL POWER PLANT CHAMBER FURNACES. *(Elementarnyy sostav goryuchikh unosov iz kamernykh topok elektricheskikh stantsiy). Text in Russian. Khim. Tverd. Topl., no. 6:128-132, 1971. 6 refs.*

The compositions of peat, brown and bituminous coal, and anthracite residues from coal-firing equipment were investigated. The hydrogen, carbon, and carbon dioxide content of the fuel gas and dust were determined. The fuel dust carried by the flue gases from chamber furnaces under normal operation conditions were composed of high-temperature coke. The combustible constituent of the fuel residues was composed of organic carbon and hydrogen, with H/C ratios ranging from 0.002 to 0.011. The relatively high hydrogen content in peat and brown coal residues was due to high hydrate and crystalline hydrate content. The incomplete combustion was due to the incomplete gasification of large coke particles. The lower the organic content, the higher the alkali and alkali earth metal content in the ashes, and the lower the combustion temperature of the fuel, the more intense the distortion of the elementary composition and the increase in the rate of elimination of the volatile components, compared to hydrates, crystalline hydrates as well as carbonates.

20994 APTIC NO. 40471

Baum, F., J. Giebel, and H. Brell

THE ANALYSIS OF GASEOUS POLLUTANTS AT HARD COAL FIRED INDIVIDUAL HEATERS. *(Ueber die Erfassung gasfoermiger Schadstoffe bei steinkohlegefeuerten Einzeloefen). Text in German. Gesundh. Ingr. 93(4):102-108, April 1972. 27 refs.*

Emissions of sulfur dioxide, hydrogen sulfide, fluorine and oxides of nitrogen from individual hard coal-fired heaters were measured. For determination of the total sulfur and fluorine emission the gas samples (1.67 cu dm/min) were passed through a quartz impinger for soot and tar separation and through two quartz-fritted scrubbers. The impinger and scrubbers contained 75 cu com 1N NaOH, 10 cu cm 3% H2O2 solution, and 5 drops of n-butanol. The same sampling set-up was used for determination of the other pollutants. As absorption fluids, however, 20 cu cm cadmium acetate solution (consisting of 50 g Cd(CH3COO)2.2H2O and 100 cu cm CH3COOH in 850 cu cm H2O) was used for the H2S determination and 120 cu cm Saltzmann solution (25 g sulfanilic acid, 250 mg alphanaphthalamine, and 250 cu cm CH3COOH in 4 cu dm H2O) was used for determination of NOx. The ash and unburned residues from the combustion were also analyzed. Two types of heaters were examined. In the first one the combustion air enters at the bottom. The waste gases pass the entire fuel charge from bottom to the top. In the second one the combustion air is supplied at various points of the heater. Anthracite briquettes were used for firing. Each combustion test lasted 2, to 3-2/3 hr. The average CO2 concentrations measured in the waste gas during one combustion period of the bottom-fed heater ranged from 4.96% by volume to a maximum of 7.73 vol %. In the second heater they ranged from 6.83 to 7.88 vol %. The concentration of SO2 emissions ranged from 270 to 848 mg/cu m in the first heater and from 495 to 677 mg/cu m in the second. The H2S emission of the bottom heater was considerably higher than that of the multi-point type. The opposite was true for the fluorine and the NOx emission. Based on the number of such heaters in the Ruhr area, their contribution to the total fluorine emission was estimated. Over the half-year of winter, 0.1 to 0.2 microgram fluorine/cu m air comes from domestic heaters.

20995 APTIC NO. 39940

Baumann, Guenther

PROPULSION AND CONTROL SYSTEMS FOR ELECTRIC AUTOMOBILES. *(Antriebe und Steuerungen fuer Elektromobile). Text in German. Society of Automotive Engineers, Inc., New York and Federation Internationale des Societes d Ingenieures des Techniques de l Automobile, Brussels (Belgium), Intern. Auto. Safety Conf., Proc., Brussels, Belgium, 1970, p. 1-25. 21 refs. (Paper 16. B.)*

Light DC driving motors of various sizes, including accompanying electronic control devices, were developed for the electric propulsion of automobiles. Infinitely variable control of the motors is insured by an electronic control circuit using silicon power thyristors stimulated by the drive and brake pedal positions as well as by driving speed. At present, lead accumulators are used as the energy source in a complete test vehicle. Maximum speed of 70-80 km/hr and ranges of 40-120 km/hr are attainable, and acceleration rates are comparable with those of conventional vehicles. A considerably increased range was obtained with a 16,000-kp bus by incorporating a charging unit driven by a diesel engine.

20996 APTIC NO. 40274

Beaty, James R

NEW YORK STATE SOUTHERN TIER WEST EMISSION INVENTORY. *Environmental Protection Agency, Durham, N. C., Air Pollution Control Office, Office of Air Programs Pub-APTD-0824, 73p., Feb. 1971. 5 refs.*

NTIS: PB 207749

Sulfur oxides, particulates, carbon monoxide, hydrocarbons, and nitrogen oxides are delineated with respect to source type, season of the year and geographical distribution within the area. The general procedure for the surveys of seven counties in southwest New York was based upon the rapid survey technique for estimating air pollutant emissions, with a grid coordinate system employed to show the geographical distribution of emissions within counties. Stationary combustion sources, especially four steam electric plants located in the area which had coal fired units, accounted for 99% of all sulfur oxide emissions and 71% of nitrogen oxides. While the four power plants also contributed the majority of particulate emissions (52%), other industrial processes contributed 12% of the emissions, the largest source of which was the mineral products industry. Motor vehicles contributed 88% of the carbon monoxide emitted annually and were the major source of hydrocarbon emissions. Railroads, aircraft, incineration, open burning, gasoline storage and handling, automobiles, and solvents also caused large amounts of pollution.

20997 APTIC NO. 39922

Bergstrom, Hilding and K. G. Trobeck

SULFUR LOSSES IN THE PRODUCTION OF SULFATE CELLULOSE. *(Svavelforluster vid sulfatcellulosaframstallningen). Text in Swedish. Svensk Papperstid. (Stockholm), 48(3):49-54, Feb. 15, 1945.*

Sulfur losses occurring in different stages of sulfate cellulose production were determined with particular emphasis on non condensable gaseous compounds. Non-condensed gases from cookers and diffusors contained 11.3 mg/l of hydrogen sulfide, 405 mg/l methyl mercaptan, and 5.3 mg/l dimethyl sulfide. Laboratory tests revealed H2S concentrations of 6.7-13.9 mg/l due to the presence of air. Waste gases from the evaporation of the black liquor contained 76.4 mg H2S and 3.5 mg CH3SH per liter, and a production rate of 7.8 tons of sulfate cellulose per hour accounted for losses of 4.69 kg H2S and 0.22 kg CH3SH. The gaseous sulfur compounds from the black liquor combustion (1.30 mg H2S, 2.65 mg CH3SH, and 0.32 mg (CH3)2S per liter) totaled a sulfur loss of 3.19 mg/l. Different procedures used for the determination of the gaseous sulfur compounds in various stages of production are described.

20998 APTIC NO. 40129

Bers, Konstantin

THE HEATING AND POWER PLANT LICHTERFELDE DER BEWAG. *(Heizkraftwerk Lichterfelde der Bewag). Text in German. Energie (Munich), 24(3):51-63, March 1972.*

West Berlin has six power plants and a seventh (Lichterfelde) under construction. The new plant will receive three blocks each with a capacity of 150 Mw. Heavy fuel oil will be used for heating of the new power plant. The combination of power and heating plant is in many ways advantageous with regard to air pollution. Through the power plant are numerous individual heaters. The waste gases of the plant are discharged through a high stack. An investigation of the background concentration of sulfur dioxide in the vicinity of the plant indicated that fuel oil with a maximum sulfur content of 2% could be burned. A maximum allowable increase of the SO2 emission by 0.35 mg/cu m has been calculated to be acceptable for the plant vicinity. The design of the plant allows the installation of a desulfurization system should its development be perfected.

20999 APTIC NO. 40941

Bertine, K. K. and Edward D. Goldberg

FOSSIL FUEL COMBUSTION AND THE MAJOR SEDIMENTARY CYCLE. *Science, 173(3993):233-235, July 16, 1971. 16 refs.*

The combustion of the fossil fuels coal, fuel oils, lignite, and natural gas may introduce some elements into the atmosphere and subsequently into the oceans at rates comparable to those of natural processes. A study was conducted to determine what elements may be mobilized about the surface of the earth as a result of fossil fuel combustion. The potential rates of movement of these elements are compared with those observed for elements entering the oceans by way of the rivers as a result of weathering processes on the continents. A table is included which lists the amounts of elements mobilized into the atmosphere as a result of weathering processes and the combustion of fossil fuels. The combustion of fossil fuels can potentially mobilize many elements into the atmosphere at rates less than but comparable to those of flow through natural water during the weathering cycle. Since the principal sites of fossil fuel combustion are in the mid-latitudes of the Northern Hemisphere, changes in the compositions of natural waters and air will be most evident in these latitudes.

21000 APTIC NO. 40572

Bishop, C. A.

METALLURGICAL FURNACE STACKS. *Am. Ind. Hyg. Assoc. Quart., 11(1):34-39, 1950. 5 refs.*

The Smoke Control Ordinance of Allegheny County, Pa., has 10 sections which deal with the operation of various equipment in steel and other metallurgical plants, such as blast furnaces, open-hearth furnaces, by-product coke plants, heating and reheating furnaces, puddling furnaces, smelting plants, bessemer converters, air furnaces, and cupolas. The Ordinance provides that a program of research be undertaken to determine practical methods of controlling the emissions caused by blast furnace slips, open hearth furnaces, and bessemer converters. Reports indicating the status of the research are to be submitted annually to the Bureau of Smoke Control. Operating variables, control methods, and research findings are presented for blast furnaces, open hearths, bessemer converters, by-product coke plants, heating and reheating furnaces, and sintering plants. Particle size of the dust from these various sources is indicated. Various types of wet scrubbers dry cyclones, centrifugal machines, filters, and electrostatic precipitators are indicated for use with blast furnaces.

21001 APTIC NO. 40159

Brandt, A. D. and D. M. Anderson

MEASURES AGAINST AIR POLLUTION CAUSED BY INDUSTRIAL SOURCES. *(De strijd tegen de luchtverVuiling afkomstig van industriele bronnen). Text in Dutch. Polytech. Tijdschr., Ed. Procestechniek (The Hague), 27(7):231-237, 1972. 26 refs. (Presented at the Environmental Control Seminar, Rotterdam, Netherlands, May 25-26, 1971).*

A general survey is given of air pollution from industrial sources in the United States, with special regard to particulate, gaseous, and fluorine pollution. The contribution of industry to air pollution was 14% with 30 million tons in 1968. Particulate pollutants are most important, followed by sulfur dioxide, hydrocarbons, carbon monoxide, and gaseous and particulate fluorine compounds. To effectively control air pollution, improved source localization techniques are required. General principles and uses of pollution control equipment such as cyclones, tissue filters, scurbbers, and electrostatic filters are reviewed. Contributions of several industries to particulate and gaseous pollution in 1967 are reviewed. Quarrying, gravel, and sand processing was the major source of particulate emissions with 4.6 million tons, followed by grain mills with 2.952 million tons. Compared to other industries, a high proportion of the emission sources is localized in the iron and steel industry, (1.490 million tons). Cokeries are a major source of HC emissions. The respective contributions by the paper and asphalt industries were 633,000 and 522,000 tons. The joint share of the cement and lime industries is 744,000 tons, followed by foundries with 217,000 tons. Brick manufacturing was responsible for the bulk of fluorine emissions. The chief sources of sulfur dioxide, carbon monoxide, and hydrocarbon emissions were primary nonferrous smelting (2,940,000 tons from the copper industry alone), petroleum refining (6.2 million tons), and petroleum products processing (1.1 million tons), respectively.

21002 APTIC NO. 40401

Brocke, Werner

FORECASTING OF POWER PLANT-, INDUSTRY- AND DOMESTIC HEATING-CAUSED AIR POLLUTION. *(Prognose der Luftbelastung durch Emissionen stationaerer Feuereungsanlagen in Kraftwerken, Industrie und Haushalt). Text in German. Luftverunreinigung, 1971:20-25, Dec. 1971. 12 refs.*

Forecasts are given for the air pollution caused by fossil fuel-based stationary firings in power plants, industry, and domestic heating in the German Federal Republic in the period from 1969 to 1980. While the primary energy consumption will rise by about 60%, the demand for fossil fuels will increase by about 44%. The pit coal consumption shows a drastic downward trend, while the demand for brown coal will be practically unchanged, and brown coal will be consumed by power plants only in 1980. Great increase in fuel oil and gas consumption will continue. Fuel specific emissions are secured for particulate pollutants and sulfur dioxide only, and the forecasts do not consider anti-pollution measures to be taken in the meantime. Particulate emissions, 50% of which are caused by stationary firings, will decrease by 25% by 1980. The respective shares of power plants, industry, and domestic heating will be 26%, 10% and 15%. Sulfur dioxide emissions from stationary firings, now 88% of the total, will increase by 50%. Against 70% in 1970, 83% of the total fluorine emissions will be caused by stationary firings in 1980, while the corresponding percentage for nitrogen oxides will be 42%. The carbon monoxide emissions from stationary firings will decrease from 2.5 million tons in 1970 to 1 million tons in 1980. Domestic heating and especially the chemical industry will be primarily responsible for organic pollutants. Communal incinerators, now emitting 1000 tons of particulate pollutants and 10,000 tons of sulfur dioxide yearly, will possibly cause local or regional pollution problems. As a result of fuel and waste gas desulfurization, SO2 emissions will drop three million tons below the 1969 level. Due to dust separation techniques, and the use of adequate fuels, a total particulate emission of 230,000 tons, instead of 800,000 tons, is expected.

21003 APTIC NO. 40742

Carleton, David A., Lawrence G. Southard, and Myra Lynn Lambert

FEASIBILITY STUDY OF THE AVAILABILITY OF INTERNATIONAL PETROLEUM SUPPLY DATA. *Bureau of Mines, Washington, D. C., 41p., April 1971.*

NTIS: PB 202165

A complete inventory of available source material has revealed that approximately 500 publications must be perused for extractive data in order to obtain annual foreign petroleum supply and demand statistics. About 98% of these data are available in Washington after a 14 month lag. International Petroleum Annual, a Bureau of Mines report is the most comprehensive worldwide petroleum supply and disposal publication available. This annual reports for each of the 116 free-world countries, the production, trade, consumption and bunkering of crude oil and each major refined product but does not include statistics relating to sulfur content. Prospects for having sulfur content data incorporated into the present reporting system are discussed. Included in the study are many of the oil trade statistics themselves. These include: output of residual products, 1969; foreign residual fuel oil desulfurization facilities, 1970; supply and demand for crude petroleum and refined products, 1969; exports and reexports of refined products, 1969; imports of refined products, 1969; world movement of crude petroleum, 1965-1968; free-world international flow of petroleum, 1970; and crude oil imports into Japan, 1969.

21004 APTIC NO. 40190

Chakraborty, M. K., R. N. Mukherjee, N. Gopalkrishnan, A. Banerjee, and D. F. Tarafdar

HAZARDS OF DUST IN THE MANUFACTURE OF REFRACTORIES. *J. Indian Ass. Occup. Health, 17(2):74-82, June 1971. 5 refs.*

Refractories are important materials needed for certain hot industries like iron and steel industries, foundries, and glass and ceramics works. But work in the refractory manufacturing industry is associated with great dust hazard which may lead to silicosis. With a view to find out the extent of this hazard in refractory industry, a study was made in 14 factories. Dust concentrations in many operations were above safe threshold limits. The dust contains high proportions of free silica making it even more harmful. Reduction could be effected in many areas by means of better plant design and institution of spraying at a few points in the processing.

21005 APTIC NO. 39952

Claussen, W. H.

INDUSTRY ACTS TO CONTROL AIR POLLUTION. *Franklin Inst., Philadelphia, Pa., Proc. Symp. Cleaner Air Urban Areas, Philadephia, Pa., 1956, p. 55-62. (May.)*

The petroleum industry has been active in both the Los Angeles and Philadelphia areas in investigating and adopting measures to reduce air pollution. For example, the western regional trade association conducted an inventory of pollutants emitted by all phases of petroleum operations in Los Angeles. A research program begun in 1953 on a nation-wide scale by a national petroleum trade association has sponsored numerous studies of fundamental a spects of air pollution. These included a project to measure the rate of oxidation of sulfur dioxide to sulfur trioxide under atmospheric conditions; no condition was found under which this oxidation is rapid enough to affect visibility in urban atmospheres. Through the Coordinating Research Council, the petroleum and automobile industries are making a comprehensive study of the composition of exhaust gases from automobiles. A cooperative plan for industry and control authorities in Los Angeles has been effective in smoke control.

21006 APTIC NO. 39820

Corey, Richard C.

SOME FUNDAMENTAL CONSIDERATIONS IN THE DESIGN AND USE OF INCINERATORS IN CONTROLLING ATMOSPHERIC CONTAMINATION. *Interdepartmental Committee on Air Pollution, Washington, D. C., Air Pollut., Proc. U. S. Tech Conf., Washington, D. C., 1950 p. 394-407. 3 refs. (May 3-5, Louis C. McCabe, ed.)*

Requirements for acceptable incinerator performance from the standpoint of certain aspects of the theory of combustion in beds of solid fuels are presented. The primary and secondary air streams should be under complete control if even rates of burning and complete combustion are to be achieved. Sufficient turbulence can be obtained with tangential motion, particularly in cylindrical incinerators; mixing chambers with forced or natural-draft air; or jets, particularly in single-stage rectangular units. The excess air must be kept to a minimum to secure minimum stack velocities and to sustain adequate temperatures in the combustion chamber. Preheat of the air is desirable to increase the enthalpy of the feed streams and to increase the reactivity of the burning bed, thus achieving higher specific combustion rates. Continuous recording of smoke density and oxygen or carbon dioxide in the flue gas can do much to improve incinerator performance. Single-stage incinerators, if properly designed, will fulfill these requirements. However, if the charging cycles are short and the charge is very wet, at least two stages are desirable.

21007 APTIC NO. 39974

Dieterich, John H.

AIR-QUALITY ASPECTS OF PRESCRIBED BURNING. *Forest Service, Asheville, N. C., Southeastern Forest Experiment Station and Duke Univ., Durham, N. C., Prescribed Burning Symp., Proc., Charleston, S. C., 1971, p. 139-151. 21 refs. (April 14-16.)*

Very little is known about the effects of forest fires on air quality. The biggest void is in the development of a reliable emission inventory. The advantages of using prescribed fire must be weighed against possible detrimental effects of fire on air quality, including a scientific evaluation of the consequences of not using fire for any of the purposes for which it is now employed. The use of prescribed fire for land management and protection carries with it an obligation to conduct burning operations in such a way as to eliminate or minimize adverse environmental impacts. Effective management of smoke from burning efforts is largely dependent on the ability to forecast weather for specific areas and to utilize the forecasts to direct the smoke away from major highways, airports, and metropolitan areas. Information is needed to develop realistic standards for air quality in rural areas. Some recent findings on forest fire emissions of particulates, carbon monoxide, hydrocarbons, and carbon dioxide are summarized.

21008 APTIC NO. 39936

Dinunno, Joseph J. and Saul Levine

ENVIRONMENTAL MATTERS CONCERNING NUCLEAR ELECTRIC POWER PRODUCTION. *Nucl. Eng. Int., 15(170-171):607-612, July/Aug. 1970. 13 refs.*

Although the relatively rapid rate of consumption of fossil fuel reserves and the pollution resulting from their use require the development of alternative sources of fuel, public concern in the United States is being voiced largely in regard to the environmental impact of electric power production. In the two major areas where public concerns about nuclear power are now being expressed (releases of radioactivity and discharge of waste heat), the current environmental impact is not significant. The standards that govern the release of radioactive effluents and the method used in their implementation result in a clearly sound approach. Further, projections several decades into the future indicate that no problem will exist. Projection in the area of thermal effects indicate that the use of water for cooling may require more careful treatment than in the past. Environmental legislation and regulations are discussed. (Author conclusions modified)

21009 APTIC NO. 40245

Eastwood, M. and F. L. Thomas

ACID PARTICLES IN URBAN ATMOSPHERE. *Environ. Health, 80(3):71-73, March 1972. 15 refs.*

Findings in the field of detection, measurement, and effects of sulfuric acid in the atmosphere in aerosol and droplet form are reviewed. The H2SO4 results from the combustion of fuels containing sulfur, which produces not only sulfur dioxide but also a small quantity of sulfur trioxide. The SO3 combines readily with water vapor to form H2SO4. The oxidation of SO2 into SO3 can take place as a result of photochemical oxidation and catalytic oxidation. Manganese and iron salts are the most effective catalysts, and high humidity favors the reaction. Qualitative determination of particulate acid may be made in conditions of high pollution with high relative humidity by drawing samples of air through a cascade impactor, a device into which air is drawn through four precisely graded slits over circular glass discs coated with a gelatinous film and a suitable indicator. The Commins method of quantitative determination is also described briefly. The health danger of the combination of particulate sulfuric acid and sulfur dioxide is suspected to be greater than the sum of the separate effects of the two.

21010 APTIC NO. 40455

Ellis, J. C.

FUTURE AUTOMOTIVE FUELS. *Automotive Eng., 80(6):36-41, June 1972. (Presented at the International Conference on Transportation and the Environment, Washington, D. C., May 31-June 2, 1972.)*

The influence of emission control requirements on gasolines is analyzed. It is believed that gasoline properties will become more important in future years, even if the present severe federal emission standards are modified. The gasoline of the future will be unleaded and of octane quality appropriate to satisfy antiknock requirements of cars. Future gasolines will also be free of all other materials inimical to engine and control system performance and durability. Additives containing only carbon, hydrogen, oxygen, and nitrogen are acceptable materials, provided they impart no deleterious characteristics to the bulk fuel and are not toxic or odoriferous. Materials such as lead, phosphorus, and sulfur, which poison catalysts or otherwise impair control system performance, will be restricted. It is predicted that the use of light olefins will not be restricted beyond the regionally imposed limits on bromine number control. Aromatic content of gasoline is expected to increase as lead is phased out and as octane quality of the unleaded grades begins to increase. This increase will have a minor effect on hydrocarbon quantity and reactivity. Evidence available at this time indicates that some reduction in the higher boiling constituents of gasoline is beneficial, and the ability of existing prototype engines and control systems to approach the 1975 emissions standards appears to be improved by such fuels. Modest changes, therefore, to accommodate emissions control requirements as well as passenger-car driveability and customer acceptability will be made.

21011 APTIC NO. 40297

Engel, Ronald E., H. Wilfried Goerke, Rauf Saygin, Arnoldo Liberti, and Jean Ternisien

AIR QUALITY CRITERIA FOR SULFUR OXIDES. *North Atlantic Treaty Organization, Expert Panel for Air Quality Criteria, Rept. 7, 328p., Nov. 1971. 455 refs.*

The effects of oxides of sulfur in the ambient air on man, materials, vegetation, and weather are described. The chemical and physical properties of these substances are discussed in relation to the concentrations and chemical reactions in the atmosphere. The corrosive effects of sulfur dioxide on various materials, its effects on vegetation, animals, and human populations, and the combined effects of experimental exposures to sulfur oxides and particulate matter on man and animals are discussed. Also, the effects of sulfur oxides and other pollutants are examined in terms of epidemiologic studies.

21012 APTIC NO. 40757

Finkelsteyn, D. H., A. P. Yelenevich, and V. N. Dymchenko

CHEMICAL COMPOSITION OF THE DISPERSED PHASE OF SMOKES GENERATED IN THE PROCESS OF MANGANESE STEEL MELTING. *(Khimicheskiy sostav dispersnoy fazy dyma, obrazuyushchegosya pri plavke margantsevykh staley). Text in Russian. Gigiena i Sanit., 11(1):25, 1953.*

Manganese aerosol smokes were prepared under laboratory conditions to study the nature of metal oxides, constituting the toxic smokes emitted during the electric furnace manganous steel and alloy melting procedures. Phase analysis revealed the presence of manganous oxide MnO, manganous and manganic oxide mixture, referred to as Mn3O4, and of iron oxides in the constitution of the sedimentating disperse phase of the above smokes. High dispersity and a relative stability constituted other features of these aerosols. The individual iron and manganese oxide levels within the emitted smoke varied according to the relative concentrations in oxygen, manganese, or iron vapor occurring above the melting surface. Gravimetric data on manganese compounds included in the emitted smokes should be expressed as MnO which constitutes the bulk of the included manganese compounds.

21013 APTIC NO. 40303

Fox, Raymond D. and Steven H. Chansky

STATEWIDE EMISSION INVENTORY OF SOUTH DAKATA. *GCA Corp., Bedford, Mass, GCA Technology Div., Office of Air Programs Contract 68-02-0041, GCA-TR-71-5-G, 67p., Aug. 1971. 48 refs.*

NTIS: PB 204947

The principal pollution sources and annual emission levels for particulates, sulfur dioxide, carbon monoxide, hydrocarbons, and nitrogen oxides by source category were investigated within an emission inventory for South Dakota. The major source categories were stationary fuel combustion sources, transportation sources, solid waste disposal, and process losses. The primary source of particulate emissions was process losses from industrial point sources, including mining, stone quarrying, cement and asphalt batch plants, and terminal and country grain elevators. Sulfur dioxide emissions were produced from a wide variety of categories including coal combustion by power plants and industrial establishments (32%), domestic heating using distillate oil (23%), commerical-institutional-industiral fuel oil (21%), and transportation sources (21%). The primary sources of CO, hydrocarbons, and NOx emissions were gasoline powered motor vehicles and off-highway gasoline used for farm tractors, with substantial contributions from petroleum bulk storage facilities, dry cleaning, solvent evaporation from surface coatings, and solid waste disposal. (Author summary modified)

21014 APTIC NO. 40625

Frost, H. J.

ENVIRONMENTAL PROBLEMS FROM AN INDUSTRIAL VIEWPOINT. *(Umweltprobleme aus industrieller Sicht). Text in German. Oeffentl. Gesundheitswesen (Stuttgart), 34(4):184-190, April 1972.*

General problems of environmental pollution as well as results attained in air pollution control are outlined. Man s efforts cause the emission of 120 million tons/yr of sulfur dioxide, while natural causes are responsible for 600 million tons/yr. The respective shares of traffic, industry, and thermal power plants in air pollution in West Germany are 60, 18, and 13%, while heating accounts for 6%, and waste disposal is responsible for another 3%. Tissue filters, cyclones, and other centrifugal equipment are best for dust separation from gases, while gaseous pollutants require scrubbers, adsorbers, or absorbers. The effects of air pollution control measures at the Ludwigshafen plant are demonstrated. The dust sedimentation around the plant dropped from 2.0 g/sq m/day in 1952 to less than 0.25 g/sq m/day despite increased production. The SO2 concentration in 1970 was at about the same level as in 1961 (0.08 mg/cu m), while the steam production increased by about 90%. The nitric oxide plus nitrogen dioxide emission in 1970 accounted for less than 60% of the 1961 level, though the nitric acid production rose by more than 40%.

21015 APTIC NO. 40600

Gautier, Armand

FLUORINE IS AN ELEMENT ALWAYS PRESENT IN EMISSIONS FROM THE EARTH CORE. *(Le fluor est un element constant de emanations du noyau terrestre). Text in French. Compt. Rend., vol. 157:820-825, Nov. 10, 1913. 5 refs.*

On-site collection of samples of the gases issuing from the volcano Mt Vesuvius shortly after its eruptions, was started in 1906 in order to establish their fluorine content. In 1913 a sampling method was successfully applied using a 1-liter bottle containing lime, in which a small tube was inserted. The tube was sealed into the bottle neck and protruded well beyond it, so that the bottle could be placed into a suitable fumarole with the tube reaching inside. The fluorine reacted with the lime, and subsequent laboratory tests of this sample showed a fluorine content of 0.110 mg/l gas, corresponding to 0.116 mg hydrofluoric acid or 0.150 mg silicon fluoride. Hydrofluoric acid is estimated to form about 1/8000 part of the total gaseous emission of volcanic fumaroles. Another set of tests was made at a location in Italy where burning gases emerge perpetually through surface cracks. A surface-cooled lead spiral was used on which the water vapor of the emission condensed, permitting collection of the non-condensable gases. These contained carbon dioxide, hydrogen sulfide, ammonia, methane, oxygen, hydrogen, nitrogen, and traces of argon and helium. The fluorine content of these gases was 0.255 mg, corresponding to 0.268 mg hydrofluoric acid/l gas. Most natural mineral waters contain fluorine. For example, the fluor content of Vichy water is 3.72 mg/l indicating a volcanic origin.

21016 APTIC NO. 40449

Gilmartin, R. P.

PREPARING LOW SULFUR RESIDUAL FUEL OILS. WHAT IT DOES TO THE OIL; WHAT IT MEANS TO THE CONSUMER. *Combustion, 43(11):29-32, May 1972. 6 refs. (Presented at the Industrial Power Conference, American Society of Mechanical Engineers, Philadelphia, Pa., June 7-8, 1971.)*

Low sulfur residual fuel oils can be prepared from either natural low sulfur crude oils or through the use of refinery processes employing a hydrodesulfurization process. Residual fuel oils from either of these two sources are significantly superior to conventional high sulfur residual fuel oil with respect to sulfur dioxide, sulfur trioxide, and particulate exhaust emissions, corrosion, and maintenance of fuel-consuming equipment. Due to the accelerated demands for energy and the broad efforts to control air pollution, the availability of low sulfur content residual fuel oil is under severe stress to meet the demand. The present data on residual fuel oil prepared from natural low sulfur crude oils indicate that some will not meet a 0.3% sulfur maximum limit. To meet this limit, more severe hydrodesulfurization processing may have to be considered by the oil industry. It appears that hydrodesulfurization of coal to produce low sulfur residual fuel oil, even though expensive at present, may be commercially feasible to satisfy the growing demand for energy and also comply with air pollution restrictions on fuel sulfur content. State and local fuel oil standards for sulfur content are tabulated.

21017 APTIC NO. 40751

Goodrich, John C. and Howard T. Fisher

COMPUTER MAPPING OF COAL RESERVES BY SULFUR LEVEL. STUDY AREA REPORT. LABORATORY FOR COMPUTER GRAPHICS AND SPATIAL ANALYSIS. *Harvard Univ., Cambridge, Mass., Graduate School of Design, Air Pollution Control Office Contract CPA 70-16, 281p., April 1971. 19 refs.*

NTIS: PB 206042

Data was provided by the Bureau of Mines for study areas in the Appalachian coal regions and a two county area in Maryland. Values for sulfur content, bed thickness, and quantity of coal were manipulated and mapped using several computer mapping programs available at the Harvard Graduate School of Design. Maps were prepared showing isolines of sulfur level for washed and unwashed coal and showing quantities in T/acre for washed and unwashed marketable coal of less than

1% sulfur content. Not all the objectives could be met. The lack of data prevented calculating quantities with the accuracy hoped for. These study areas are representative of data and problems to be encountered elsewhere and the techniques can now be applied to other areas of the U. S. subject to the constraints and accuracy of the required data.

21018 APTIC NO. 40085

Grey, Donald C., Mead LeRoy Jensen, and Henry L. Dequasie

ATMOSPHERIC FLUIDS PROVENANCE USING STABLE ISOTOPES. *Utah Univ., Salt Lake City, Lab. of Isotope Geology, Public Health Service Grant 1 RO1 AP00627, Trans. 01051441, Rept. 5242, 51p., Sept. 1971. 23 refs.*

The technique of isotopic fingerprinting has proven useful in the Salt Lake Valley for determining the source of sulfur pollution. The several sources of atmospheric sulfur compounds in the area are isotopically characteristic, and their effluents can generally be distinguished, and their relative contributions to the general levels in the atmosphere determined. In the Salt Lake Valley, the major source of atmospheric sulfur compounds is a large copper smelting operation. Bacteriogenic hydrogen sulfide appears to be the second largest source. Petroleum refineries and a coking operation were minor contributors. Increasing levels of carbon dioxide were fossil fuel consumption by metal smelters in the Salt Lake City area and were often seven or eight times the mean level for the free atmosphere. Metal smelters produce larger quantities of CO2 than sulfur dioxide. Routing and rapid sampling for isotopic analysis is now possible using a particle filter, followed by a 3 angstrom sieve dehydrator, followed in turn by a smaller volume 4 angstrom sieve on which the sample was collected. A 70 cfm blower drawing air at about 12 cfm powered the unit. The motors used were high speed units designed for 110 vac and were run on inverters for field use. (Author abstract modified)

21019 APTIC NO. 40304

Gronhovd, G. H., A. E. Harak, and P. H. Tufte

ASH FOULING AND AIR POLLUTION STUDIES USING A PILOT-PLANT TEST FURNACE. *Bureau of Mines Information Circ., no. 8471:69-88, 1970. 6 refs. (Presented at the Bureau of Mines-University of North Dakota Symposium, Grand Forks, N. Dak., May 1-2, 1969.)*

A pilot-plant furnace design to study ash fouling and air pollution problems is described. The furnace is a reasonably good model of a commerical pulverized coal-fired boiler. Air pollution studies showed that the North Dakota lignites, the percentage of the input sulfur that appears as gaseous sulfur oxides in the stack gas varies with the sulfur level and alkali content of the coal, but normally it is considerably lower than that for bituminous coals. No measureable sulfur trioxide has been found in the flue gas when burning North Dakota lignites, although sulfur dioxide levels have been as high as 1,400 ppm. Installation of a pilot-plant electrostatic precipitator has been completed, and a program is planned for studying the variables affecting precipitation of fly ash from low-sulfur coals. (Author summary modified)

21020 APTIC NO. 40780

Hauspurg, Arthur, Edward W. Major, Jr., and Arnold R. Adler

BARGE MOUNTED GAS TURBINES. *Proc. Am. Power Conf., vol. 33:474- 483, 1971.*

The Consolidated Edison system in New York City and adjoining Westchester county plans to use four gas turbine carrying barges to handle peak summer and winter loads. Barge mounted turbines offer two unique advantages. First, there can be short lag-time between ordering and on-site delivery of power. Secondly, the option is open for selling or leasing the capacity to other utilities should Con Edison s needs change. Thirty-two gas turbines capable of delivering 622 MW are to be mounted eight to a barge. The barges will be 217 ft long, 12 ft deep, and have a 79 f beam. The barges have been designed to be towable on the open ocean and are capable of navigating the Mississippi and its major tributaries. Each barge is capable of delivering a normal peak rating of 155.5 MW at 95 F inlet air, burning No. 2 distillate oil.

21021 APTIC NO. 40743

Hedin, Tore, Jonas Norrby, Bengt Nordstroem, Jan-Eric Ryman, Bo Aler, Marten Martensson, and Nils Holmin

ELECTRIC POWER PRODUCTION IN SWEDEN IN THE 1970 S. *Central Operating Management, Vallingby (Sweden), 31p., Nov. 1962.*

NTIS: NP 18691

At the start of the 1970 s, hydroelectric power will continue to dominate the Swedish power supply system. Condensing power will mainly represent a reserve for dry years. Nuclear power will become competitive during the first half of the decade and will become the major new source added by the second half. New hydro and condensing sources are also expected to be added to the supply. Condensing power will still be no more than a supplementary supply. Back pressure, combined plant, power will increase but will represent no more than 10% of the new additions to generating resources. Potential hydro plants, which will probably not be exploited, comprise a valuable reserve in the event that other sources under development do not become as competitive as assumed. (Author conclusions modified)

21022 APTIC NO. 40784

Helfinstine, R. J., N. F. Shimp, and J. A. Simon

SULFUR VARIETIES IN ILLINOIS COAL: FLOAT SINK TESTS. *Illinois State Geological Survey, Urbana, Public Health Service Contract PH 86-67-206, 99p., Aug. 10, 1969.*

NTIS: PB 206464

21023 APTIC NO. 40595

Hoefig, Reinhard

AIR POLLUTION PROBLEMS CAUSED BY THE USE OF PLASTIC BINDERS. *(Probleme der Luftverunreinigung bei der Verwendung von Kunstharzbindern). Text in German. Giessereitechnik, 15(8):250- 254, Aug. 1969. 8 refs*

The continuing modification of the casting process by foundries in which mixtures of sand and plastics are used (hot box, core preparation process, dielectric core drying) has created a new pollution problem. The plastic added to sand as a binder solidifies through polymerization by electrical heating to 250-350 C in core boxes. The phenol-formaldehyde resins decompose and release toxic gases containing carbon monoxide, carbon dioxide, formaldehyde, phenols, and acetaldehyde in varying amounts. The short-term maximum permissible emission concentrations for formaldehyde are 0.035 mg/cu m, for phenol 0.01 mg/cu m, and for CO 6.0 mg/cu m. At 300 C the resin decomposition products contain 220 mg/cu m formaldehyde and 3500 mg/cu m phenol; at 1000 C, CO predominates as the main toxic component (60 mg/cu m), as determined experimentally. Concentrations of 6000 mg/cu m CO were found in smoke plumes emitted from the permanent mold casting process, with 10 mg/cu m formaldehyde and 400-1000 mg/cu m phenol. Continuous casting requires exhaust ducts with subsequent catalytic combustion of toxic emissions at 800-900 C, temperature at which autogenic combustion takes place with complete oxidation of all hydrocarbons. The use of platinum as a catalyst has now largely been replaced by base metals on a ceramic carrier.

21024 APTIC NO. 40325

Hoffman, Alan J.

WILLAMETTE VALLEY AIR POLLUTANT EMISSION INVENTORY. *National Air Pollution Control Administration, Durham, N. C., Air Quality and Emission Data Div., Office of Air Programs Pub-APTD-0836, 72p., March 1970. 8 refs.*

NTIS: PB 207752

An air pollutant emission inventory for the Willamette Valley area was conducted in September 1969 in order to gather data and give emission estimates representative of the year 1968. The study area, which was chosen on the basis of the distribution of population and air pollution sources, consisted of 10 counties in the State of Oregon which included the cities of Portland, Salem, and Eugene and five counties in the State of Washington. All sources of emissions were classified into six categories -- transportation, stationary fuel combustion, industrial processes, refuse losses, evaporative losses, and miscellaneous combustion. Each category was divided into two subgroups -- point sources and area sources. Facilities emitting large quantities of air pollutants were considered individually as point sources, while the many remaining contributors such as automobiles, residential fuel users, small commercial and industrial facilities, and on-site refuse burning equipment were considered collectively as area sources. The predominant sources of the 49,600 tons of sulfur oxides emitted were combustion of fuels (38%) and industrial process losses (48%). The largest source of the 118,200 tons of particulate matter was industrial process emission, while field and slash burning was the second largest. Motor vehicles contributed 68% of the 1,018,000 tons of carbon monoxide emitted, with other important sources including solid waste disposal, industrial processes, and field and slash burning. The two largest sources of the yearly 187,000 tons of hydrocarbons were motor vehicles and evaporative losses, contributing 31% and 29%, respectively. Motor vehicles and stationary fuel combustion were primary sources of the 70,600 tons of nitrogen oxides emitted. Emissions were estimated by using various indicators such as fuel consumption, refuse burning rates, vehicle-miles, production data, control efficiencies, and emission factors relating these indicators to emission rates. Since individual sources have inherent differences that cannot always be taken into consideration, discrepancies between the actual and estimated emissions are more likely in individual sources than in the total emissions for a source category.

21025 APTIC NO. 40582

Holmes, J. A., Edward C. Franklin, and Ralph A. Gould

REPORT OF THE SELBY SMELTER COMMISSION. *Bull. Bureau Mines, no. 98:1-62,503-520, 1915. 86 refs.*

A commission was established to determine whether the Selby Smelting and Lead Co., Contra Costa County, California, was violating court orders restraining the company from emitting uncontrolled sulfur dioxide and smoke to the atmosphere. The commission found that no economic damage was being done by the relatively small daily output of sulfur (24.6-28.3 tons in the first 4 mo of 1914). The blast furnace gave off only invisible gases, the visible part of the smoke was removed by the blast furnace baghouse. The parting retort stack also gave off only invisible gases, the visible part was removed by a Cottrell electrostatic precipitator. Visible smoke was produced, however, by the roaster stack. This smoke and the sulfur dioxide generated during roasting operations constitute the only nuisance effect of present smelter operations. The company should make efforts to recover the SO2 as sulfur, sulfuric acid, or liquid sulfur dioxide and to remove dust and fumes from the Ropp roaster gases. Diffusion, plant damage, effects on materials, the effects on farm animals, and the attitudes of the residents were discussed.

21026 APTIC NO. 39996

Hottel, Hoyt C. and Jack B. Howard

AN AGENDA FOR ENERGY. *Technol. Rev., 74(3):38-48, Jan. 1972.*

Assessing the technical and economic adequacy of existing or proposed processes and their consistency with developing standards of environmental quality, and suggesting where additional effort is most needed to accelerate change are discussed. Sources and demands of energy are expected to grow; present efficiency of energy conversion and utilization of technical issues must be resolved to maintain or increase that efficiency. How to reconcile the clear gain in living standards associated with more energy use, with the consequences of growth of energy consumption at the present rate, is the biggest challenge of the 20th century. Several sources of conversion are discussed, such as gas from coal, oil from coal, oil from tar sands and oil shale, and the utilization of nuclear power, solar energy, and central power from fossil fuel. Learning how to use energy, research directed toward improvements in efficiency of use, and how to supply an ever-increasing demand per capita, are all to be encouraged. Sulfur dioxide is a major combustion-related pollutant.

21027 APTIC NO. 40779

Humphries, James J., Jr. and Donald H. Guild

TECHNICAL AND ECONOMIC FEATURES OF STONE AND WEBSTER S FAST COMBINED-CYCLE POWER PLANTS. *Proc. Am. Power Conf., vol. 33:492- 502, 1971*

The combined-cycle generating plant uses both combustion and steam turbines to provide mid-range load capacity. A series of combined- cycle plants are designed for utilities using components already proven in commercial service. These plants can operate 1000 to 5000 hr/yr, generate 230-264 MW, are air or water cooled, and can be on-line 36 months from order. The efficiencies of gas and steam turbines are discussed. Costs are cited.

21028 APTIC NO. 40524

Ishiguro, Tatsukichi

MEASUREMENT AND EVALUATION METHODS OF ODOR POLLUTANTS AT SOURCES AND ENVIRONMENT. (1). *(Hasseigen ya kankyo ni okeru akushu osenshitsu no sokutei ya hyoka no shohoho, sonoichi). Text in Japanese. Akushu no Kenkyu (Odor Research J. Japan), 1(5):20-25, Aug. 1971.*

This is a brief report on the Third Symposium on Environmental Health, sponsored by the Kaolinska Association and held in Stockholm from June 1 to 5, 1970. The symposium members, an ntroductory statement concerning the world-wide problems of bad odor pollution, and some points and trends are discussed. Most reports were on the measurement of odor pollutants and various methods of evaluation, based on special studies of pulp mill exhausts and automobile exhaust. However, these are by no means the only or major emission sources of bad odor. Kraft pulp mills were in particular the center of discussion. Determination of bad odor emission standards seems to be the most important problem at present. This is to be derived from the standpoint of concentration, exposure time, meteorological mutual reactions, and all other overt and hidden factors. The odor emission standard is scheduled to be announced in the United States in 1972, and according to these standards, odor control programs and enforcement plans are to be applied starting in 1973. Oregon and Washington have special regulations concerning emission of odor pollutants from pulp mills. In these states, the total sulfur emission from the recovery boiler of Kraft Pulp mills are expected to be reduced to 2 lbs/ton of pulp; by July 1975, this will further be reduced to 0.5 lb/ton.

21029 APTIC NO. 40781

Janulis, V. J. and H. D. Clemens

DESIGN ASPECTS OF POWERTON STATION UNIT 5 COMMONWEALTH EDISON COMPANY. *Proc. Am. Power Conf., vol. 33:399-411, 1971.*

Powerton Station Unit five is a nominal 800 megawatt coal-fired unit being constructed at the existing power station south of Pekin5, Ill. It is unusual in that two once-through boilers will operate on a common header to supply steam to a single tandem compound turbine. Critical analysis indicated that an 865 ft high chimney would result in acceptable ground level concentrations of sulfur dioxide and particulates. The boilers are served by gas recirculation mechanical dust collectors and electrostatic precipitators. An objection to the 865 ft chimney by the Federal Aviation Administration resulted in construction being limited to 500 ft.

21030 APTIC NO. 40032

issen, H. Dieter

DIESEL ENGINES IN THE SQUEEZE. DOES LOW EMISSION HAVE TO GO AT THE COST OF ECONOMY? (Dieselmotoren in der Zange. Muss Umweltfreundlichkeit zu Lasten der Wirtschaftlichkeit gehen?). Text in German. VDI (Ver. Deut. Ingr.) Nachr. (Berlin), 26(15):1, April 1972.

Development of the diesel engine is caught between the demands for low fuel consumption and low pollutant emission. The trend toward an engine with direct injection and low fuel consumption has recently been giving way toward an engine with a preliminary combustion chamber for reduced emissions of oxides of nitrogen. Unburned hydrocarbons and carbon monoxide emissions are hardly negligible from diesel engines. The soot emission problem is considered solved. Exhaust gas recycling is receiving increasing consideration.

21031 APTIC NO. 40314

Kehoe, Robert A., Frederick Thamann, and Jacob Cholak

ON THE NORMAL ABSORPTION AND EXCRETION OF LEAD. III. THE SOURCES OF NORMAL LEAD ABSORPTION. *J. Ind. Hyg., 15(5):290- 300, Sept. 1933. 70 refs.*

Certain classes of foodstuffs frequently contain more than average amounts of lead; among these in the order of increasing importance are, bread-stuffs, meats, processed meats, ice-cream, candy, leafy green vegetables, and certain fruits. Opportunities for the ingestion of lead with food are greater under the more highly industrialized conditions of American life than in the more primitive Mexican environment. This is attributed to the use of lead insecticides. The presence of lead in food is to be expected partly as a normal occurrence and partly as a consequence of contamination from a variety of sources. The chief problem from lead compounds is not in the lead absorption of the general public but in the high incidence of occupational lead poisoning. Lead mines, lead smelters, automotive exhaust, pottery, and water pollution are other sources of lead.

21032 APTIC NO. 40361

Kenmochi, Kazumi

ENERGY PRODUCTION AND PUBLIC NUISANCE. *(Energi seisan to kogai). Text in Japanese. Kankyo Hakai (Environ. Destr.), 2(11):6-25, 55-60.*

Air pollution problems caused by thermal power generation, desulfurization processes, and atomic power generation are discussed generally and briefly, and atomic power plants now under construction in Japan, toxic materials emitted from thermal power plants in various parts of Japan per hour and per year, and the effects of sulfur dioxide on humans, animals, and plants are tabulated. Desulfurization of crude oil to 85%, operating for 8 yrs with 8% benefit in order to desulfurize 2.2% sulfur content oil to 0.2%, would cost approximately $4/kl original crude oil. The manufacture of the hydrogen which is necessary for desulfurization is an important cost factor; if it can be lowered one yen, or 0.3 cent, the cost for 1% desulfurization will decrease 15 cents/kl. The difficulty of desulfurizating stack gas is the large quantity of emission gas involved. For instance, when 100 g oil is completely burned by theoretical air, a total of 1207.2 l combustion gas is created. This is 12,000 times over the amount of stack gas created by the combustion of 0.1 g heavy oil. The amount of stack gas is extremely large in the case of thermal power plants. A plant with a capacity of 1 million kw/hr creates 2.8 million N cu m/hr gas, and treatment of such a quantity of stack gas requires a very large system. The manganese dioxide and activated carbon methods of desulfurization are described.

21033 APTIC NO. 40213

Kircher, David S.

CHEYENNE, WYOMING AREA AIR POLLUTANT EMISSION INVENTORY. *National Air Pollution Control Administration, Durham, N. C., Air Quality and Emission Data Div., Office of Air Programs Pub-APTD-0813, 58p., July 1970. 8 refs.*

A four-county area in the southeastern corner of the state of Wyoming was surveyed with respect to five categories of emissions: transportation, stationary fuel combustion, solid waste disposal, industrial processes, and evaporative losses. Stationary fuel combustion was the largest source of sulfur oxides, contributing 54.3% of that pollutant, with transportation and process losses accounting for the remainder. Industrial process losses, especially cement manufacturing, were the major source of particulate emissions. Transportation sources contributed approximately 60,000 tons/year of carbon monoxide, over 70% of the total in the study area. The annual emission of hydrocarbons, 19,310 tons, were caused by evaporative losses (49.2%), transportation sources (32.3%), and process losses (12.2%). Transportation was the source of 53.4% of the oxides of nitrogen. Natural gas combustion was responsible for 26.2% of this emission. A grid coordinate system was employed to show geographic distribution within the study area.

21034 APTIC NO. 40281

Kircher, David S.

SAN JUAN, PUERTO RICO METROPOLITAN AREA AIR POLLUTANT EMISSION INVENTORY. *Air Pollution Control Office, Research Triangle Park, N. C., Div of Air Quality and Emission Data, Office of Air Programs Pub-APTD-0831, 61p., Jan. 1971. 3 refs.*

NTIS: PB 207750

Estimates are provided of total emissions of oxides of sulfur, oxides of nitrogen, hydrocarbons, carbon monoxide, and particulate matter. The emissions of these pollutants are delineated with respect to source, season of the year, and geographical distribution. Source categories considered were stationary fuel combustion, transportation, solid waste disposal, industrial processes, and evaporative losses. Facilities that emitted large quantities of air pollutants were considered individually. The largest portion of the sulfur oxides emitted (83%) came from steam-electric plants in the area. The combustion of fossil fuels by other stationary sources accounted for 14% of the sulfur oxides emitted. The majority of the particulate emission (74%) came from transportation and stationary fuel combustion sources. Transportation sources contributed 84% of the annual carbon monoxide emissions. Exhaust gases from motor vehicles was the primary source of hydrocarbon emissions (54%). Other smaller evaporative loss sources accounted for 29%. Sixty percent of total nitrogen oxide emissions was contributed by steam-electric plants. Transportation sources accounted for 28%.

21035 APTIC NO. 40322

Kircher, David S.

TREASURE VALLEY, IDAHO, AREA AIR POLLUTANT EMISSION INVENTORY. *National Air Pollution Control Administration, Durham, N. C., Air Quality and Emission Data Div., Office of Air Programs Pub-APTD- 0833, 56p., June 1970. 6 refs.*

NTIS: PB 207699

An air pollutant emission inventory for the Treasure Valley (Boise, Idaho) area was conducted in May 1970 in order to gather data and give emission estimates representative of the year 1969. All sources of emissions were classified into five categories -- transportation, stationary fuel combustion, industrial processes, refuse losses, and evaporative losses. In turn, each category was divided into two subgroups -- point sources and area sources. Facilities which emit large quantities of air pollutants were considered individually as point sources, while the many remaining contributors such as motor vehicles, residential fuel users, small commercial and industrial facilities, and on-site refuse burning equipment were considered collectively as area sources. The annual estimates for emissions in the Treasure Valley Metropolitan Area for 1969 are as follows (tons/year): sulfur oxides 3,600, particulates 5800, carbon monoxide - 90,400, hydrocarbons - 16,900, and nitrogen oxides 10,900. The major source of sulfur oxides is fuel combustion which amounts to 81% of the total emission of this pollutant. Combustion of fuels, process losses, and transportation are the largest sources of particulates, contributing 26%, 39%, and 25% respectively. The primary contributor of carbon monoxide is motor vehicles (91%), while other significant sources include fuel combustion and refuse disposal. Evaporative losses (44%) and transportation (48%) are the two most important sources of hydrocarbon emissions in the study area. Fuel combustion and transportation sources contribute 97% of the nitrogen oxide emissions. Emissions were estimated by using various indicators such as fuel consumption, refuse burning rates, production data and control efficiencies, and emission factors relating these indicators to emission rates. Since individual sources have inherent differences that cannot always be taken into consideration, discrepancies between the actual and estimated emissions are more likely in individual sources than in total emissions for a source category.

21036 APTIC NO. 40388

Kobayashi, Yoshitaka

URBAN ATMOSPHERIC POLLUTION BY AUTOMOBILE EXHAUST AND THE PRESENT CONDITION OF DEVELOPMENTAL RESEARCH FOR NO-EMISSION CAR. *(Jidosha haigasu ni yoru toshi osen to mukogaisha kaihatsu kenkyu no genjo). Text in Japanese. Oyo Butsuri (Tokyo), 40(11):1253-1260, Nov. 1971. 10 refs.*

Automobile exhaust gas and its toxic components, the method of measuring pollutants, the state of urban pollution by automobile exhaust gas, and photochemical smog in Los Angeles are reviewed. The slow adjustment control method and the use of a cleansing device are briefly discussed. An application of slow adjustment can result in an extremely high carbon monoxide ratio. Therefore, the adjustment must be made while measuring the boost pressure, rotation, and CO concentration in the exhaust. Carbon monoxide concentration is measured by an exhaust gas sampler while the engine is idling. If the CO concentration is more than 25%, the slow adjustment screw of the carburetor is slightly tightened and the engine is returned to a normal rotation. After waiting several seconds until the test indicator is stabilized, CO concentration is again measured. The cleaning device provides additional air to the exhaust gas for the purpose of recombustion. The catalyst or the flame method is used and 80 to 90% of hydrocarbons and CO can be eliminated. Modified engines now under development in the U. S. include the Cleaner Air Package, which utilizes carburetion to achieve complete combustion at all times. Ignition is delayed or quickened automatically by the pressure in the carburetor, depending on the driving mode. The air injection reaction reactor system uses a recombustion chamber behind the engine exhaust valve. Electric cars are being developed both in the U. S. and Japan. Japanese firms plan to develop an electric car (1-ton sedan) by 1973, with a horsepower three times that of a lead battery, which can run 200 to 300 km on 3 hr of charging.

21037 APTIC NO. 40393

Kunz, Karl A.

THE MERCEDES BENZ NATURAL GAS TEST BUS OG 305. *(Der Mercedes-Benz-Erdgas-Versuchsomnibus OG 305). Text in German. Staedtehygiene (Uelzen/Hamburg), 23(4):106-108, April 1972.*

An automobile manufacturer has equipped a city bus with a natural gas-driven engine which operates according to the principle of the Otto engine. The trial runs with the test bus were preceded by theoretical studies and by experimental dynamometer studies with high-pressure natural gas. The bus carries 72 pressurized gas bottles. At a maximum operating pressure of 200 atm gage about 116 cu m gas are available. The heating value of this gas quantity corresponds to that of 105 l diesel fuel. The bus weighs about 700 kg more than a diesel bus with a gasoline tank for 105 l. Operation with liquid gas will be tested in a second test series. This would have the advantage of causing a higher weight of only 130 kg. Exhaust emissions of the natural gas-driven engine is far below the limits which will go into effect in California in 1975 (more than 20% below the limit for hydrocarbons and one-twelfth of the allowable carbon monoxide concentration). Moreover, natural gas contains no lead or sulfur compounds.

21038 APTIC NO. 40580

Laamanen, Arvo

AIR POLLUTION CONTROL AND INDUSTRY. *(Ilmansuojelu ja teollisuus). Text in Finnish. Teollisuusliitto Ilmoittaa, no. 1:9-15, 1969.*

There are different types of sources of air pollution including area sources, such as industrial areas and highways, and point sources, such as smoke stacks, incinerators, diesel engines, and airplanes. The increase in industrial versatility has also increased the number of different pollutants in the air. These pollutants remain in the air for varying lengths of time, which depends on such factors as gravity, diffusion, clouds, and rainfall. In Finland the use of wood as a fuel has decreased significantly, and the use of coal dropped 20% in the first 4 yrs of the previous decade. As the use of oil as an industrial fuel increases, so should research regarding its emission. Despite the vast increase of industrial development in Finland, industrial air pollution has not increased linearly. Even though Finnish industry has to be classed as relatively small, there are several steps that should be taken now to improve air pollution control, among them improved international co-operation and up-dating air pollution control laws.

21039 APTIC NO. 40345

LaGrone, F. Scott and Clinton E. Burklin

FINAL REPORT FOR STATEWIDE EMISSIONS INVENTORY FOR THE STATE OF LOUISIANA. *Radian Corp., Austin, Tex., Office of Air Programs APTD-0794, 77p., Sept. 8 1971. 14 refs.*

NTIS: PB 204949

Area and point source emissions of sulfur compounds (sulfur dioxide and sulfur trioxide), particulates, carbon monoxide, nitric oxide, nitrogen dioxide, and hydrocarbons and their derivatives were calculated within an emission inventory for Louisiana. Procedures involved in gathering data on emissions and fuel consumption, determination of the grid systems, survey methodology, data analysis, and actual calculations of emissions are reviewed. The point sources included chemical processing, coal cleaning, detergent and soap manufacturing, ink manufacturing, paint and varnish production, fertilizer plants, synthetic fiber and rubber production, food and feed operations, rendering, primary and secondary metallurgical processes, mineral processing, petroleum refining, pulp and paper manufacture, dry cleaning, surface coating operations, gasoline marketing, steam-electric power plants, incinerators, and open burning dumps. Area source emissions were calculated from combustion and consumption data on coal, fuel oil, natural gas, residual oil, and distillate oil with vessels, railroads, diesel motor vehicles, gasoline motor vehicles, airport operations, solid waste disposal, and process losses as major area sources. Sample inventory forms, data tabulations, and area maps are included.

21040 APTIC NO. 40787

Larson, Gordon P., George I. Fischer, and Walter J. Hamming

EVALUATING SOURCES OF AIR POLLUTION Ind. Eng. Chem., 45(5):1070- 1074, May 1953. 17 refs.

Data on air sampling for any locality must be related to the activities in that locality which produce the pollution if the information is to be of full value in a program for air pollution control. Methods are presented for determining the quantities of the various pollutants created within an area, and it is shown how these emissions can be related to air sampling data to permit year- to-year comparisons of pollution levels; a perpetual index of concentrations as a check against excessive emissions; a gage of progress in pollution reductions as controls are invoked; understanding of the meteorologic factors which influence dispersion; detection of pollutants with concentrations greater than their sources account for, indicating the influence of other mechanisms; and a guide to the planning of future control measures. Aerosols must be evaluated in terms of their ability to reduce visibility. This can be determined by means of a relative pollution index for each material which is based upon the radius of the aerosol particle involved, its index of refraction, and the quantity. An example is cited whereby correlated studies of source and air samples reflect technological changes which alter pollution levels and delimit major smog-contributing sources that must be investigated for ultimate means of control. Important pollutants of the Los Angeles atmosphere and their concentrations are listed, as well as the part each pollutant plays in causing the effects observed during periods of smog. (Author summary modified)

21041 APTIC NO. 40389

Laussermair, Friedrich

LIQUID NATURAL GAS A CLEAN BURNING FUEL FOR CITY BUSES. *(Fluessig-Erdgas - ein sauberer Brennstoff fuer den Stadtomnibus). Text in German. Staedtehygiene (Uelzen/Hamburg), 23(4):103-105, April 1972.*

In 1970 Munich operated a total of 470 buses for public transportation which consumed a total of 6500 tons of fuel/year. Based on the specific pollutant emission by diesel engines the following pollutant quantities are emitted per year: 195 tons of carbon monoxide, 65 tons of hydrocarbons, 293 tons of nitrogen oxides, and 18 tons of soot. Using natural gas as fuel, 169 tons of CO, 19.5 tons of hydrocarbons, and 31 tons of NOx are emitted per year. The use of liquefied natural gas for city buses is proposed. The ideal mixing process between a gaseous fuel and air, as well as the high hydrogen-to-carbon ratio of methane, proceduces clean burning in the engine. With the proposed system, air pollution from exhaust emissions can be reduced 60-90%, depending on the components of the gas.

21042 APTIC NO. 40759

Lehnert, G.

LEADED GASOLINE - AN ECOLOGICAL POISON? (Bleibenzin - ein ekologisches Gift)? Arch. Hyg. Bakteriol. (Munich), 152(5): 559-563, 1969 (?). 36 refs. Translated from German. Leo Kanner Assoc., Redwood City, Calif., llp., Dec. 1971.

The demands of todays automobile engines on antiknock performance have led to the practice of adding tetraethyl lead and/or tetramethyl lead to the fuel, with maximum concentrations of 1.12 g/l. During the combustion process, the lead alkyls break up into water, carbon dioxide, and lead oxide. Since the melting point of Pb2O3 is at 900 C, in order to avoid a clogging of the cylinder chambers, ethylene dichloride and dibromide are added to the knock suppressor. By means of these halogen compounds, more volatile lead chloride and lead bromide are created which, together with other highly toxic exhaust gas components, escape from the engine into the atmosphere. By means of these automobile exhausts, the general public is contaminated by lead through inhalation. Based on an average atmospheric Pb(II) concentration of 2 cu/m, the human organism is burdened with approximately 30 micrograms Pb(II)/l at an average volume of breath inhaled of 10 l/min. The primary cause for clinically objectifiable Pb(II) damage is the ability inherent to a greater or lesser degree in all inorganic matter to act as enzyme effectors. Since Pb(II) forms quite stable mercaptides with thiol groups, it is the prototype of an inhibitor of SH containing enzymes. Hence, in addition to a disturbance of the electrolyte equilibrium, it also influences numerous metabolic processes, possibly the biosynthesis of hemoglobin, the nucleic acids, proteins, and various hormones.

21043 APTIC NO. 40286

Lipska, A. E. and N. J. Alvares

CHEMICAL CONSTITUENTS OF SMOKE AND CONJECTURE AS TO THEIR ROLE IN FOAM DESTRUCTION. *Preprint, Combustion Institute, Western States Sect., 27p., 1971. 65 refs. (Presented at the Combustion Institute, Western States Section, Spring Meeting, Denver, Colo., 1971, Paper 71-2,WSS-CI.)*

The effect of pyrolysis and combustion products on the stability of a high-expansion, fire-extinguishing foam is summarized based on an extensive literature search and new experimental evidence. The chemical classes, their sources, relative concentrations, vapor pressure of a number of the compounds, and the foam-breaking action of the compounds were examined. The compounds resulting from the thermal degradation of paper, wood, tobacco, gaseous fuel, and liquid fuel and exhaust included aliphatic hydrocarbons, aldehydes, ketones, acids, alcohols, light gases (ammonia, carbon monoxide, and carbon dioxide), esters, furans, aromatic compounds, and cyclic and polynuclear compounds. The widest product distribution resulted from the pyrolysis of wood. Compounds that form emulsions with water shorten the lifetime of the foam considerably, whether they are introduced via the foam generator or otherwise. Although, generally, compounds that exhibit low surface tension and low vapor pressure promote foam formation, no correlation was observed between these characteristics and foam stability, even in solutions composed of the high-expansion foam and such surface-acting substances as organic acids, alcohols, and esters. Other factors, such as the pH of the solution and the concentration, solubility, and viscosity of the foaming agent may dominate in influencing foam stability.

21044 APTIC NO. 40945

Macchi, Ennio and Gustavo Giglioli

PERSPECTIVES OF COMBINED GAS-ORGANIC VAPOR CYCLES FOR AIR CONDITIONING STATIONS WITH HIGH EFFICIENCY AND LOW POLLUTANT RATE. *(Sull utilizzazione di cicli cimbinati gas-vapore organico per impianti di climatizzazione a basso tasso di inquinamento e ad alto rendimento). Text in Italian. Termotecnica (Milan), 26(4):171-184, April 1972. 25 refs.*

The present tendency of adopting more expensive and less polluting fuels emphasizes the importance of fuel consumption in the economy of air conditioning plants. Large thermodynamic irreversibilities, due to large temperature drops during the heat transfer, are associated with conventional solutions. Higher efficiencies, and therefore lower fuel consumptions, can be achieved by more complex plants, where the mechanical work is produced by a power cycle and the waste heat is recovered by heat exchangers. An analysis of various prime movers is presented and the potential of combined gas-organic vapor cycle is shown. The considered solutions can be used for heating and refrigerating purposes, the fuel savings being considerable for both situations. (Author abstract modified)

21045 APTIC NO. 40340

Mallette, Frederick, S.

A NEW FRONTIER: AIR POLLUTION CONTROL. *Proc. Inst. Mech. Engrs. (London), 1954:595-615, April 9, 1954. 60 refs.*

Areas in the United States and Canada where definite accomplishment of significant developments were made in air pollution control are discussed. Legislative developments which brought about reduced air pollution are presented. Model ordinances include those in St. Louis, Mo., Pittsburgh, Pa., New York City, and Los Angeles County, Calif. The influence of meteorological factors upon the dispersion or accumulation of air pollutants is apparent, but an understanding of the fundamental factors, other than wind, is just being reached. Temperature, lapse rates, stability, and smog influence pollution. The highlights of the Donora, Pa. smog of 1948 are presented. A description of the control procedures and equipment presently in use there are given, together with a statistical analysis of the air sampling and meteorological data which is collected. The development of instrumental methods and socio-ecomonic aspects are also discussed. Problems of the iron and steel industry include emissions from coke ovens, blast furnaces, open hearth furnaces, bessemer converters, and electric furnaces. Power production, chemical processing, and the rubber industry also cause pollution.

21046 APTIC NO. 40030

Manteuffel, Winfried

MAINTENANCE OF CLEAN AIR THROUGH THE USE OF GAS AS A SALE- PROMOTING ARGUMENT. *(Luftreinhaltung durch Gasverwendung als verkaufsfoerderndes Argument). Text in German. Gas Wasserfach, Gas Erdgas (Munich), 113(1):26-27, Jan. 1972.*

In the Federal Republic of Germany about 2.5 million tons of soot and dust and about 5 million tons of sulfur dioxide are emitted annually. The latter damages plants and above a certain concentration causes physical damage in humans. If the air pollution in industrial centers could be reduced to only one-half its present value, the average life expectancy of a newborn baby would rise by 3-5 yrs, the incidence of heart and circulatory diseases would decrease by 10 to 15% and lung disease 25%. Natural gas, which burns without toxic emissions and particularly without SO2 emissions contributes significantly to the protection of the environment. This fact together with the concern for environmental protection provides a good sales-promoting argument for natural gas.

21047 APTIC NO. 40097

Mason, David V.

HOUSTON-GALVESTON AIR POLLUTION EMISSION INVENTORY. *National Air Pollution Control Administration, Durham, N. C., Air Quality and Emission Data Div., Office of Air Programs Pub-APTD-0818, 59p., July 1969. 11 refs. NTIS: PB 207691*

Estimates are provided of total emissions of oxides of sulfur, oxides of nitrogen, hydrocarbons, carbon monoxide, and particulate matter. The emissions of these pollutants are delineated with respect to source type, season of the year, and geographical distribution. Source categories considered were stationary fuel combustion, transportation (vehicles, aircraft, trains, and ships), solid waste disposal, industrial process losses, and evaporative losses. Facilities that emitted large quantities of air pollutants were considered individually. In 1967 there were 143,000 tons of sulfur oxides emitted, 155,000 tons of particulates, 1,066,400 tons of carbon monoxide, 291,000 tons of hydrocarbons, and 213,000 tons of nitrogen oxides. Industrial processes accounted for 93% of the sulfur oxides, 84% of particulates, and 62% of hydrocarbons. Road vehicles contributed 76% of carbon monoxide. Nitrogen oxides emissions were fairly evenly divided between industrial fuel use, 32%; road vehicles, 21%; industrial processes, 21%; and steam electric sources, 21%.

21048 APTIC NO. 40278

Mason, David V.

BEAUMONT-PORT ARTHUR METROPOLITAN AREA AIR POLLUTANT EMISSION INVENTORY. *National Air Pollution Control Administration, Durham, N. C., Air Quality and Emission Data Div., Office of Air Programs Pub-APTD-0810, 56p., March 1970. 10 refs.*

NTIS: PB 207685

Estimates are provided of total emissions of oxides of sulfur, oxides of nitrogen, hydrocarbons, carbon monoxide, and particulate matter. The emissions of these pollutants are delineated with respect to source type, season of the year, and geographical distribution. Source categories considered were stationary fuel combustion, transportation, solid waste disposal, industrial process losses, and evaporative losses. Facilities that emitted large quantities of air pollutants were considered individually. In 1968 there were 124,500 tons of sulfur oxides emitted, 24,700 tons of particulates, 608,900 tons of carbon monoxide, 198,500 tons of hydrocarbons, and 47,200 tons of nitrogen oxides. Of the total pollution in these five groups, industrial processes contributed 98%, 73%, 75%, 86%, and 45%, respectively.

21049 APTIC NO. 40283

Mason, David V.

SALT LAKE CITY, PROVO, AND OGDEN METROPOLITAN AREA AIR POLLUTANT EMISSION INVENTORY. *National Air Pollution Control Administration, Durham, N. C., Air Quality and Emission Data Div., Office of Air Programs Pub-APTD-0830, 60p, Feb. 1970. 12 refs.*

NTIS: PB 207698

Estimates are provided of total emissions of oxides of sulfur, oxides of nitrogen, hydrocarbons, carbon monoxide, and particulate matter. The emissions of these pollutants are delineated with respect to source type, season of the year, and geographical distribution. Source categories considered were stationary fuel combustion, transportation, solid waste disposal, industrial process losses, and evaporative losses. Facilities that emitted large quantities of air pollutants were considered individually. In 1968 there were 260,300 tons of sulfur oxides emitted, 60,500 tons of particualtes, 290,200 tons of carbon monoxide, 54,000 tons of hydrocarbons, and 48,800 tons of nitrogen oxides. Industrial processes accounted for 89% of sulfur oxides, 61% of particulates, 15% of carbon monoxide, and 12% of hydrocarbons. Road vehicles contributed 64% of carbon monoxide, 28% of hydrocarbons, and 23% of nitrogen oxides. Solid waste disposal contributed 16% of particulates, 16% of carbon monoxide, and 25% of hydrocarbons. The predominant cause of nitrogen oxides was industrial fuel use, 28%.

21050 APTIC NO. 40766

Matteucci, M.

PECULIARITIES OF THE ERUPTION OF VESUVIUS. *(Sur les particularites de l eruption du Vesuve). Text in French. C. R. Acad. Sci. (Paris), vol. 129:65-67,1899. 1 ref.*

Changes in the area of the volcano Mt. Vesuvius in the years immediately following its eruption in 1895 are reported including details of the locations of openings where the lava had burst through; of the subsequent formation of a cupola-shaped accumulation of solidified lava, 163 m high with a volume of 125 million cu; and of the crater opening which increased from 136 to 180 m in diameter from 1897 to 1899. The depth of the crater is about 200 m. By the side of the cone and somewhat beyond its base, a series of crevices in spread over a length of 1600 m, a width of 400 m, and and area of about 500,000 sq m. The emissions from the fumaroles, developed in the eruption, contained hydrochloric acid, sulfur dioxide, hydrogen sulfide, carbon dioxide, sulfur, gypsum, various sulfates and chlorides of iron and copper, erythosiderite, chlorides and sulfates of sodium and potassium, salts of ammonia, selenium, hydrofluoric acid, hydrobromic acid, and hydroiodic acid. The presence of hydroiodic gas in the volcanic emissions concurs with the fact that iodine is found in the efflorescence of the lava surface. The frequent presence of iodine in volcanic rock formations, particularly in granite, is of particular interest.

21051 APTIC NO. 40571

McCabe, Louis C.

STREAM POLLUTION. INTERRELATIONSHIP OF AIR POLLUTION AND WATER POLLUTION. *Sewage Ind. Wastes, 24(1):83-86, Jan. 1952. (Presented at the Federation of Sewage and Industrial Wastes Associations, Annual Meeting, 24th, St. Paul, Minn., Oct. 8-11, 1951.)*

The close connections between air and water pollution in the minerals industry is discussed. Water pollution problems include acid drainage from coal workings, silting of surface water channels, and oil field wastes. Smoke, cinders, fly ash, chemical dust, fumes, and odors are found in the wastes discharged to the atmosphere. The use of wet collectors to scrub gases and dusts from the effluents of some of the chemical plants provides an excellent example of the interrelationship of air and water pollution. The discharge from such collectors can often be disposed of without treatment into a stream large enough and sufficiently pollution-free to insure dilution; otherwise, the chemical content of the discharge water must be neutralized or its dust content deposited in settling tanks or basins. Recovery of sulfur and rare metals from stack effluents, and of petroleum wastes in the oil industry, is also discussed.

21052 APTIC NO. 40318

McGraw, Michael J.

LAS VEGAS METROPOLITAN AREA AIR POLLUTANT EMISSION INVENTORY. *National Air Pollution Control Administration, Durham, N. C., Air Quality and Emission Data Div., Office of Air Programs Pub-APTD-0819, 58p., May 1970. 10 refs.*

The pollutants which include sulfur oxides, particulates, carbon monoxide, hydrocarbons, and nitrogen oxides, are delineated with respect to source type, season of the year, and geographical distribution within the area. A rapid survey technique was employed. All sources of emissions were classified into five categories: transportation, stationary fuel combustion, solid waste disposal, industrial processes, and evaporative losses: Facilities which emitted large quantities of air pollutants were considered individually. The largest source of sulfur oxides was a coal burning power plant in Clark County, which emitted 80% of the total sulfur oxide emissions. Individual point sources of particulates from industrial processes accounted for almost 84% of the total particulate emissions in the area. About 93% of the carbon monoxide emissions was contributed by motor vehicles. Exhaust gases and evaporative losses from motor vehicles contributed 74% of the hydrocarbon emissions. Half of all nitrogen oxides were emitted from transportation sources, 34% was contributed by the combustion of coal and natural gas at the steam electric plants.

21053 APTIC NO. 40326

McGraw, Michael J.

RENO AREA AIR POLLUTANT EMISSION INVENTORY. *National Air Pollution Control Administration, Durham, N. C. Air Quality and Emission Data Div., Office of Air Programs Pub-APTD-0829, 39p., Aug. 1970. 2 refs.*

NTIS: PB 207697

An emission inventory for the Reno Metropolitan Area was conducted in March 1970 in order to gather data and give emission estimates representative of the year 1969. The study area, which was chosen on the basis of the distribution of population and air pollution sources, consisted of five counties surrounding Reno and Carson City. This area covers approximately 9400 sq mi and had a 1969 population of 161,500. The sources of emissions were classified into five categories -- transportation, stationary fuel combustion, solid waste disposal, industrial processes, and evaporative losses. Furthermore, each source category was divided into two subgroups -- point and area sources. Facilities which emit large quantities of air pollutants were considered individually as point sources, while the many remaining contributors such as motor vehicles, residential and commercial fuel users, small industries, and on-site refuse burning equipment were considered collectively as area sources. A breakdown of air pollutant emissions by source type and pollutant indicates that sulfur oxides accounted for 2500 tons, particulates for 35,500 tons, carbon monoxide for 128,500 tons, hydrocarbons for 17,700 tons, and nitrogen oxides for 10,000 tons of emissive pollutants during the year 1969. Automobile emission was the largest factor in carbon monoxide, hydrocarbon, and nitrogen oxide emissions. Industrial processes were primarily responsible for particulates, and fuel combustion processes were most responsible for sulfur oxide emissions. Furthermore, evaporative losses contributed significantly to the total hydrocarbon tonnage and, likewise, road vehicles contributed heavily to sulfur oxide output. Emissions were estimated by using various indicators such as fuel consumption, refuse burning rates, vehicle-miles, production data, control efficiencies, and emission factors relating these indicators to emission rates. These factors represent average emission rates for a particular source category. Since individual sources have inherent differences that cannot always be taken into consideration, discrepancies between the actual and estimated emissions are more likely in individual sources than in the total emissions for a source category.

21054 APTIC NO. 40225

Meltzer, Joseph and Donald Lapedes

HYBRID HEAT ENGINE/ELECTRIC SYSTEMS STUDY. VOLUME I: SECTIONS 1 THROUGH 13. (FINAL REPORT). *Aerospace Corp., El Segundo, Calif., Office of Corporate Planning, Environmental Protection Agency Contract FO4701-70-C-0059, Rept. TOR-0059(6769-01)-2-V.1, 491p., June 1, 1971. 152 refs.*

NTIS: PB 201645

The feasiblity of using a hybrid heat engine/electric propulsion system to reduce air pollution from exhaust of street operated vehicles was investigated. Hybrid vehicle specifications for a family car, commuter car, intracity bus, and delivery/postal van are derived for various operating and traffic situations. For the family and computer car, only the spark ignition internal combustion engine and the gas turbine engines can be practically packaged into the hybrid vehicle. Relative costs for the spark ignition, diesel, gas turbine, Rankine, and Stirling engines are derived, along with data on fuel consumption, emissions, performance, and design characteristics. Lead-acid, nickel- cadmium, and nickel-zinc batteries were studied for adequacy in supplying acceleration power. The scope of the study, vehicle specifications, research methodology, computational techniques, computer systems used, and systems synthesis data are discussed.

21055 APTIC NO. 40095

Morita, Clyde B. and David S. Kircher

MID CONNECTICUT-LOWER PIONEER VALLEY AIR POLLUTANT EMISSION INVENTORY. *National Air Pollution Control Administration, Durham, N. C., Air Quality and Emission Data Div., Office of Air Programs Pub APTD-0822, 71p., July 1970. 10 refs.*

NTIS: PB 207692

Estimates are provided of total emissions of oxides of sulfur, oxides of nitrogen, hydrocarbons, carbon monoxide, and particulate matter. tThe emissions of these pollutants are delineated with respect to source type, season of the year, and geographical distribution. Source categories considered were stationary fuel combustion, transportation, solid waste disposal, and industrial processes. Emissions were estimated by using various indicators such as fuel consumption, refuse burning rates, vehicle-miles, production data, and control efficiencies and emissions factors relating these indicators to emission rates. Facilities that emitted large quantities of air pollutants were considered individually. The combustion of fossil fuels in stationary sources contributed more than 98% of the 353,000 tons of sulfur oxides emitted in 1967 and 60% of total particulate emissions. Motor vehicles accounted for 93% of the 845,000 tons of carbon monoxide and 85% of the 124,000 tons of hydrocarbons. The two largest sources of the 136,000 tons of nitrogen oxides emitted were motor vehicles and stationary fuel combustion sources, contributing 36% and 61% respectively.

21056 APTIC NO. 40284

Morita, Clyde B.

PHOENIX-TUCSON METROPOLITAN AREA AIR POLLUTANT EMISSION INVENTORY. *National Air Pollution Control Administration, Durham, N. C., Air Quality and Emission Data Div., Office of Air Programs Pub-APTD-0827, 51p., Oct. 1969. 13 refs.*

Estimates are provided of total emissions of oxides of sulfur, oxides of nitrogen, hydrocarbons, carbon monoxide, and particulate matter. The emissions of these pollutants are delineated with respect to source type, season of the year, and geographical distribution. Source categories considered were transportation, stationary fuel combustion, solid waste disposal, industrial process losses, organic solvent evaporation, and agricultural operations. Facilities that emitted large quantities of pollutants were considered individually. The predominant source (99.7%) of the more than 2 million tons of sulfur oxides emitted in 1967 was the copper smelting industry. Various source types, including transportation, industrial process, and agricultural operations contributed to the 34,300 tons of particulate matter. Motor vehicles accounted for 94% of 535,000 tons of carbon monoxide. The two largest sources, contributing 57% and 28% respectively, of the 125,000 tons of hydrocarbons were motor vehicles and organic solvent evaporation. Motor vehicles also contributed more than 55% of the 62,400 tons of nitrogen oxides.

21057 APTIC NO. 40392

Mueller, Hans-Georg

ELECTRIC TRACTION ON THE ROAD - WHY, HOW AND WHEN? (Elektrotraktion auf der Strasse - Warum, wie und wann). Text in German. Staedtehygiene (Uelzen/Hamburg), 23(4):108-110, April 1972. 8 refs.

Until the turn of the century the number of automobiles driven by combustion engine and by electric motor was about equal. Both drove at relatively slow speeds. Then came the explosive development of the combustion engine while no improvements were made in the electric motor. With the current concern about environmental pollution, interest in electric power has revived. Emissions from large power plants are much more easily controlled than are exhaust gas emissions by individual cars. Battery-operated automobiles span only relatively short distances. Three possibilities exist to circumvent this disadvantage. Automobiles which drive 50 to 70 km daily can be recharged overnight in a garage. If there is no time for night-charging, the battery can be exchanged within minutes at a battery-changing station. For automobiles driven to suburban areas the hybrid system can be used, where the electric drive operates in the urban area and the combustion engine takes over outside the city. Buses, cabs, small trucks, and street cleaning trucks are the most suitable vehicles for the electric engine.

21058 APTIC NO. 40947

Mutsaars, P. M. and J. E. Van Steen

DETERMINATION OF LEAD ALKYLS IN GASOLINE: A COMBINED GAS CHROMATOGRAPHIC-FLAME PHOTOMETRIC METHOD. *J. Inst. Petrol. (London), 58(560):102-107, March 1972. 9 refs.*

A method was developed for separation and detection of lead alkyls by combining gas chromatography with flame photometry. Any chromatograph is suited, but in this case a coiled aluminum column filled with Chromosorb was used. The flame photometer was a model 139 UV-VIS Hitachi Perkin Elmer spectrophotometer equipped with a modified flame attachment and photomultiplier unit, connected to a Honeywell-Brown type 15-1 mV potentiometric recorder with disc integrator. The method proved to be fast, reliable, and accurate. The whole concentration range from 1000 ppm down to 1 ppb can be covered by injecting a suitable amount of sample. No previous treatment of the sample is necessary. Interference by other components is almost completely eliminated. (Author summary modified)

21059 APTIC NO. 40523

Ogiwara, Taeko, Kenji Kuratani, and Keizo Yata

SECONDARY AIR FOR BURNER COMBUSTION AND THE COMPOSITION OF COMBUSTION PRODUCT. *(Bana nensho ni okeru niji kuki to haiki sosei ni tsuite). Text in Japanese. Preprint, Science Council of Japan, Tokyo, 4p., 1971. (Presented at the Symposium on Combustion, 9th, Tokyo, Japan, Dec. 3-4, 1971.)*

The chemical transformation of the combustion product that is caused by the mixture of secondary air is extremely complex. By treating it as a single flow of reactions with chemical transition, the process was simplified and mathematically explained. If the fuel burns with the air completely in the first combustion, the combustion gas includes carbon monoxide, carbon dioxide, hydrogen, water, nitrogen, nitric oxide, oxygen, and hydroxides. All but NO reach the equilibrium at the primary combustion temperature; but the amount of NO is determined by the combustion temperature and the duration in which NO remains in the primary combustion area. In mathematical calculation of the transition of chemical composition of combustion gas during the secondary combustion, the unit time for each of components, flow molecular amount per unit, flow entropy, flow direction, and flow speed are considered.

21060 APTIC NO. 40607

Padovani, C.

AIR POLLUTION FROM FUEL PROCESSING. *(L inquinamento atmosferico dovuto all uso o alla lavorazione dei combustibili). Text in Italian. Riv. Combust. (Milan), 9(3):179-209, 1955. 21 refs. (Presented at the Congresso Nazional d Igiene, 17th, Venezia, Italy, Oct. 1954.)*

Air pollution caused by fuel combustion from industrial furnaces and domestic fires is reviewed, as well as pollution due to fuel processing from coal distillation, gasification, and petroleum refining. Particular reference is made to problems arising from the use of coal gas rich in carbon monoxide and to the exhaust gases from internal combustion engines. Methods of measurement and of quantitative analysis of air contaminants are also considered. Actions and regulations designed to prevent or to reduce the emission of harmful agents to the atmosphere are discussed. (Author summary modified)

21061 APTIC NO. 40560

Parsons, Ray S.

THE USE OF NATURAL GAS AS A MEANS OF REDUCING POLLUTANTS FROM MOTOR VEHICLES. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 8p., 1970. (Presented at the Air Pollution Control Association, West Coast Section, Technical Meeting, 5th, San Francisco, Calif., Oct. 8-9, 1970.)*

A fuel system that substitutes compressed natural gas (CNG) for gasoline in the internal combustion engine was described. In this system, gasoline is used as a stand-by fuel. If operation of motor vehicle beyond the range of stored CNG is desired, the pull of a choke-like cable located on the dashboard converts operation of the vehicle to gasoline. The dual-fuel system does not require significant engine modification and is not expensive. Compressed natural gas tanks are located in or on the vehicle. A fuel line connects the tanks to a regulator assembly installed in the engine compartment of the vehicle. The regulators reduced the pressure of the CNG before it enters a gas/air mixer, which is located on top of the carburetor. The gas/air mixer includes an air filter and replaces the air cleaner. The control cable changes the setting in the gas/air mixer to allow either CNG or gasoline operation interchangeably. Current retail cost of the equipment is $300/conversion kit. Composite results show that the reduction of air pollution emissions are below the California 1975 standards of 12.0 g/mi for carbon monoxide, 0.5 g/mi for unburned hydrocarbons, and 1.0 g/mi for nitrogen oxides. In all test results, the most important hydrocarbon reductions occurred in the olefins and aromatics. Other advantages include quick startup, no air pollution through fuel evaporation, the engine oil remains clean, and no vapor lock problems.

21062 APTIC NO. 40776

Patterson, Donald J.

THE AUTOMOBILE AIR POLLUTION RESEARCH AND EDUCATION. *Michigan Univ., Ann Arbor; Eastern Michigan Univ. Ypsilanti; and Wayne State Univ., Detroit, Mich., Proc.: Mich. Water Air Pollut. Stand., 1970, p. 36-51.*

Gasoline powered automobiles emit unburned hydrocarbons, carbon monoxide, oxides of nitrogen, oxides of sulfur, and particulate matter. On a nationwide basis, automobiles contribute 92% of the CO, 4% of the SO2, 46% of the oxides of nitrogen, 63% of the hydrocarbons, and 8% of the particulates in the atmosphere. Exhaust emissions have been reduced by 70% and good potential remains for an additional 25% reduction. Annual inspections of emission control devices are advised. The petroleum industry has proven that emissions are unrelated to fuel blend. They have found that the tendency to form combustion chamber deposits is caused by tetraethyl lead and future additives that modify or reduce deposit buildup can improve the emission picture. A reduction in fuel volatility can cut evaporative losses of hydrocarbons in half. There are, however, many who feel that the gasoline engine will be unable to meet emission levels set for 1980. As a result, a great deal of interest has been generated in alternative power plants such as electric car and steam engines. Research and study programs at the University of Michigan are discussed.

21063 APTIC NO. 40090

Perry, Harry, Eugene T. Sheridan, and Joseph A. DeCarlo

CHANGING TRENDS IN THE USE OF COKE IN THE UNITED STATES. *Bureau of Mines Information Circ., no. 8096, 31p., 1962. 28 refs.*

One of the most notable achievements of the iron and steel industry in the United States was the general increase in productivity of individual blast furnaces and the reduction of the coke rate. In the past decade, the output of the average furnace increased by 1/3, while fuel rates decreased from 15 to 20%. Coke rates of individual furnaces varied, but some furnaces operated on less than 1200 lbs/t of pig iron. Several factors have influenced this improvement in blast furnace operations. Foremost is the increased use of agglomerates, made possible by new developments in iron ore beneficiation. Changes in operating techniques and other operating variables, however, also contributed significantly to the lower coke rates and increased production. A new operating technique is supplemental fuel injection accompanied by increased hot-blast temperature. Studies based on tests made in its experimental blast furnace using natural gas in one test and anthracite fines in another, showed substantial increase in hot-metal production with large reductions in coke-rate. It is impossible to predict what the minimum coke rate will be in the future, but there is evidence that it may be limited only by the coke required to maintain the operability of the furnace. (Author summary modified)

21064 APTIC NO. 40161

Pichler, Helmut and Hans-Erhard Driesen

GAS SUPPLY AND ENVIRONMENTAL PROTECTION. *(Gasversorgung und Umweltschutz). Text in German. Gas Wasserfach, Gas Erdgas (Munich), 113(1):2-7, Jan. 1972. 24 refs. (Presented at the DVGW-, VGW-VKW-Landesgruppen Baden-Wuerttemberg, Schwaebish- Hall, West Germany, April 1, 1971.)*

The increasing consumption of power will lead to a dangerous increase of air pollution if no control measures are taken. Gas causes the least emissions all the way from its production to use. With a share of 15% of the power consumed in the Federal Republic of Germany and a contribution of just 0.2% to the sulfur dioxide emission and barely 3% to all other pollutants emitted by electric power plants, it deserves to be called the clean power. Emissions in the production of gas have been considerably reduced by switching from coal as raw material to low-boiling hydrocarbons. Parallel to this switch, gas production in numerous individual plants was combined in large gas generator plants with remote gas supply. Emissions of dust, soot, and SO2 will in future be solely a problem of coking plants. In neither cracking plants nor in the production of natural gas are particulates emitted. The emission of SO2 by cracking plants underfed with fuel oil can be reduced by using low-sulfur fuel oils. Contaminated waste gas from coking plants contains about 40 g SO2/10,000 kcal. Its removal is somewhat more economical than with other SO2-containing waste gases because of the higher concentration. In the combustion of all types of gas, the emission of carbon monoxide, nitrogen oxides, and formaldehyde can be better minimized than with coal or fuel oil.

21065 APTIC NO. 40651

Pirk, H. and U. Tillessen

CONTINUOUS COMBUSTION METHOD AS HEAD END STAGE FOR REPROCESSING FUEL ELEMENTS FOR HIGH TEMPERATURE REACTORS. *(Kontinuierliches Verbrennungsverfahren als Head End zur Aufarbeitung von Brennelementen fuer Hochtemperaturreaktoren). Kerntechnik, 14(4): 158-161, 1972. 7 refs.*

Considerations and experiments relating to the scaling up of the shaft furnace process from the single sphere model to the cold pilot plant are described. The interest in the shaft furnace, abandoned earlier in favor of the fuildized bed method, was revived in the context of reprocessing spherical fuel elements because a graphite sphere possesses better properties than crushed graphite (smaller specific surface area which limits the rate of combustion, small risk of a runaway reaction, and sufficient reaction rate for an industrial process). Thermogravimetric and gas analytical studies revealed that the combustion rates of matrix graphite and pyrolytic carbon differ considerably, and that the effect of the Boudouard reaction may be neglected. Graphite gasification was not promising for an industrial process. The carbon monoxide/carbon dioxide ratio had a characteristic value at each temperature, and increased exponentially with the temperature. Below about 100 C it was possible to burn the CO in the vicinity of the sphere secondarily, while above this temperature the entire oxygen was consumed for primary combustion. The results suggest that the combustion of massive fuel elements should be a two-step process, and that the temperature should be limited to 1100 C to avoid excessive CO concentrations in the flue gas. The first stage of a pilot plant facility is described. Here, the oxygen-enriched air flow (30% of O2) is from top to bottom. An air silfter, located in the exhaust line, separates the particles from the dust which is then precipitated in a cyclone with back-up metal filters. The dust is returned pneumatically with air to the first stage furnace. Development work is in progress on a combination of a fluidized bed and of a solid bed in a quartz apparatus. With a flow rate of 20[illegible] coated particles/hr, the residual carbon content in the combustion residue is less than 0.1%. An engineering and economic feasibility study was carried out in the context of enlarging the facility. The throughput of 80 spheres/hr is sufficient for processing the breed elements for a reactor power output of 1900 MW. In enlarging the facility, the volume/cooling surface ratio must be kept constant by adopting a rectangular or annular furnace cross-section. There are no apparent difficulties in utilizing the above technique also for crushed block elements.

21066 APTIC NO. 40761

Reguerirо, Jose F.

COLLECTION AND ASSESSMENT OF AIRCRAFT EMISSIONS. *Teledyne Continental Motors, Muskegon, Mich., Environmental Protection Agency Contract 68-04-0035, Teledyne Rept.635, 136p., Oct. 22, 1971.*

NTIS: PB 204196

Gaseous emissions (nitric oxide, hydrocarbons, and carbon monoxide) were measured from 20 motors manufactured by Teledyne Continental Motors. Five each of four different models were tested. A 13 mode test cycle was adopted to simulate a standard cycles from cold start to shutdown and hot start. Climb and pattern modes contributed 85% of the NO emissions and 75% of the CO. Hydrocarbon emissions are significant during all modes. A special series of tests was conducted with the GTSIO-520-H engine to gain insight into future approaches to reduce exhaust emissions. Various operating variables are discussed such as air/fuel ratio.

21067 APTIC NO. 40648

Schuler, Th.

THE OXYGEN DEMAND AT THE COMBUSTION OF SYNTHETICS. THOUGHTS ON THE OXYGEN BALANCE OF THE ATMOSPHERE. *(Sauerstoffbedarf bei der Verbrennung von Kunststoffen. Nachdenkliches zur Sauerstoffbilanz der Atmosphaere). Text in German. Chem. Rundschau (Solothurn), 25(20):611, May 1972.*

One kg of fuel oil requires 19 kg of air or 2 to 4 kg oxygen for complete combustion. One liter of gasoline requires 2.3 kg oxygen to achieve this end. Zurich consumes 3.5 million tons of oxygen annually for heating. Of the commonest synthetics, polyvinyl chloride (PVC) consumes the least oxygen at combustion. In the year 1968 the PVC-fraction in the total refuse quantity accumulated in Switzerland was 0.28%. For a complete combustion of the PVC fraction, 5502 tons of oxygen are needed. For combustion of the annual quantity of waste paper of about 160,000 tons, 100,000 tons of oxygen are required. For the route Zurich-New York, a DC-8 airplane consumes 40 to 50 tons of fuel and 190 to 230 tons of oxygen. A 6 to 7.5 hectare forest needs one year to produce that amount of oxygen. If the present trend of combustion of fossil fuels continues, 0.2% of the existing oxygen will be consumed. Every type of combustion will affect this.

21068 APTIC NO. 40645

Schwarz, Carl -Henning

REFUSE INCINERATION. *(Muellverbrennung). Text in German. Brennstoff-Waerme-Kraft, 24(4):155-159, April 1972. 30 refs.*

The annual refuse quantity in the Federal Republic of Germany amounts to 68 million tons/yr. About 20% of the domestic refuse is burned in 35 incineration plants. The heat developing during combustion can be used either for long-distance heating systems or for the production of electricity. Damage to tubes due to corrosion can be avoided by injecting a sufficient quantity of oxygen and by providing for constant but not too high tube wall temperatures. Tests showed that up to 10 weight% of plastic waste can be burned without difficulties if well mixed with other refuse. In Hamburg the polyvinyl chloride content of the refuse was increased artificially to nearly 10%. There was a direct relation between the hydrochloric acid content in the flue gases and the chlorine contents in the refuse. One percent of polyvinyl chloride develops for about 1000 mg HCl/cu m flue gas. Actually the average HCl emission of the municipal incineration plants is 600 to 800 mg/cu m flue gas, the sulfur dioxide emission is a little bit higher.

21069 APTIC NO. 40385

Schwarz, Vilem

METHODICAL FINDINGS AND PROBLEMS AT THE PROJECTING OF HIGH CAPACITY POWER PLANTS. *(Methodische Erkenntnisse und Probleme bei der Projektierung von Waermekraftwerken grosser Leistung). Text in German. Energietechnik, 22(4):153-162, April 1972. (Presented at the Kraftwerkstechnischen kolloquium. 3rd., Oct. 28-29, 1971, Dresden, East Germany.)*

Czechoslovakia now has five power plants in operation, each with a capacity of 200 MW. Twelve more are either in construction or in the planning state. A prototype of a 500 MW block will begin operation at the end of 1977. Between 1980 and 1990 eight more 500 MW blocks will be built and between 1990 and 2000, another 11. Of the total of 20 blocks with 500 MW, 11 will be fired by soft coal and nine by heavy fuel oil. Stringent regulations for the protection of the environment are in effect. The high mountains which enclose Czechoslovakia impair natural ventilation processes. Population density is high and the power plants will have be located on relatively small sites. These factors require the accurate calculation of the emission contribution by power plants to total air pollution. For each emission source the smoke plume elevation through buoyancy beyond the stack exit and the distribution of ground level concentrations are automatically calculated with the aid of a computer. Use of a computer permits calculation of up to 500 individual emission sources.

21070 APTIC NO. 39862

Shipley, J. W.

SOME CHEMICAL OBSERVATIONS ON THE VOLCANIC EMANATIONS AND INCRUSTATIONS IN THE VALLEY OF 10,000 SMOKES, KATMAI, ALASKA. *Amer. J. Sci., 50(296):141-153, 1920. 12 refs.*

Volcanic gases have been pouring out continuously from vents distributed over a 50-square-mile area since the eruption of the Katmai crater in southwestern Alaska in 1912; in the course of time they have built up large masses of incrustants around the vents. Examination of the incrustants revealed the presence of the following compounds: sulfur, arsenic, fluorides, corundum, silica, boron, gypsum and apatite, potassium alum, iron, vivianite, pyrite, manganese, and aromatic hydrocarbons. Water vapor was the major component of the issuing gases, but hydrogen sulfide, sulfur dioxide, volatile ammonium compounds, and hydrochloric and hydrofluoric acids were also detected. While the majority of incrustants were secondary products arising from decomposition of ash by volcanic gases, the great volume of escaping vapors had a magmatic origin. The mineralization going on in the area may be due to water liberated by contact of the crystallized crust of earth with heated magma.

21071 APTIC NO. 40243

Sirolo, Josip

FUEL AS A FACTOR IN INTERNAL COMBUSTION ENGINE EMISSIONS. *(Gorivo kao faktor emisija motora s unutrasnjim izgaranjem). Text in Serbo-Croatian. Nafta (Zagreb), 22(8):687-697, 1971. 6 refs. (Presented at the Scientific Association of Oil of the Yugoslavian Academy of Sciences Conference on Fuel Oil, Zagreb, May 7, 1971.)*

The impact of the fuels used for the internal combustion engine on the exhaust composition was studied. Included are graphs describing the variation of the total hydrocarbon component expressed as such or in ethylene equivalents, the aromatic hydrocarbon or the whole range of hydrocarbons, and the nonhydrocarbon share of the exhaust as affected by the volatility of the fuel. Premium and regular high and low olefin gasolines and diesel fuels were studied. Abatement of automotive emissions appeared to be achieved by varying the volatility and the light fraction composition of the fuels. Propane as a fuel had the lowest emission with the least photoreactive properties.

21072 APTIC NO. 39987

Smirnov, G. A.

SOME DATA ON AIRBORNE CARCINOGENS. *(Nekotoryye dannyye ob aerokantserogenakh). Text in Russian. Kazan. Med. Zh., no. 5: 19-21, 1971.*

Carcinogenic pollution from aircraft engines was studied by determination of the benzo(a)pyrene in test engine-produced soot, in turbojet and turboprop engine exhaust, in soil and plant samples taken from a 1.5 km radius distance from an airport, and in snow samples taken from the airport. Extraction of benzo(a)pyrene was made with pure benzene and its determination was performed by fluorescence spectrometry in n-octane solutions. Turbojet engine soot from TU-104 aircraft contained 350 micrograms/kg of benzo(a)pyrene and turboprop soot revealed 250 micrograms/kg. Both types of test engines emitted 2.0 4.0 mg/min under nominal operating conditions. Soil samples taken along and perpendicular to the liftoff-landing path up to 1.5 km from the airport indicated a decreasing trend from 68 1.3 micrograms in the second series of samples compared to control soil samples which had 0.3, 0.5, or 0.8 micrograms/kg soil. Grass samples contained 21.3 5.4 micrograms/kg green matter and 7.0-3.0 micrograms/kg roots, opposed to 0.5-0.7 and 0.2-0.3 found in their respective counterparts examined 15 km from the airport. Snow samples taken from the airport revealed 2.22-0.28 micrograms benzo(a)pyrene/sq m/24 hr, opposed to 0.03-0.1 micrograms/sq m accumulated in 24 hr 15 km from the airport.

21073 APTIC NO. 40319

Smith, D. S. and E. S. Starkman

A SPECTROSCOPIC STUDY OF THE HYDROXYL RADICAL IN AN INTERNAL-COMBUSTION ENGINE. *Combustion Inst., Pittsburgh, Pa., Symp. (Int.) Combust., (Proc.), 13th, Salt Lake City, Utah, 1970, p. 439-449. 23 refs. (Aug. 23-29.)*

Direct spectroscopic determination was made of hydroxyl radical concentration in the immediate postcombustion gases of a spark ignition engine operating on isooctane and air. Hydroxyl radical was found to vary by as much as plus or minus 50% from cycle to cycle. Measured concentrations exceeded equilibrium calculations by an order of magnitude, but the relative effect of mixture strength was as predicted by equilibrium projection. Operation at a near stoichiometric fuel-air equivalence ratio of 0.98 resulted in a 30%-60% greater concentration of hydroxyl radical than that with 25% rich mixture. The experimental results obtained for the high-pressure post-combustion history of the hydroxyl radical agree quantitatively with the trends obtained from low-pressure flame studies by other investigators. The degree of hydroxyl radical hyperequilibrium in the postcombustion process in the engine cylinder increase with increasing mixture richness. Hydroxyl concentrations approach in absolute magnitude the chemical equilibrium values as the expansion proceeds. Quantitatively, however, excess over equilibrium is considerably less in the engine process than in the flames. This is probably due to wall reactions and the increased effect of termolecular recombination reactions at the elevated pressures experienced in the engine. (Author abstract)

21074 APTIC NO. 40786

Smith, Walter R.

HERE S A FLARE THAT WILL ELIMINATE AIR-POLLUTING SMOKE. *Petrol. Process., 9(6):876-881, June 1954. 4 refs.*

A smokeless, non-polluting flare, built at ground level that has been in successful low-cost operation for two years is described. Smoke is eliminated by injecting water into the combustion zone. The basic design of the flare consists of three concentric masonry stacks, each of which has a different function. Gas is released to the flare through a 12-inch line terminating in the center stack. A water spray located in the center stack mixes water with gas. Two pilots, located 180 deg apart, ignite the gas-water mixture at the top of this center stack. When flaring takes place at normal rates, the major portion of the combustion takes place in the intermediate stack and is completed in the outside stack. Proper operation of the flare necessitates control of spray pressure in relation to flaring rate. The formula commonly used for calculating the induced draft in a standard type furnace stack is included. When the draft and amount of air for complete combustion are known, the area of the outside arches may be calculated by an appropriate orifice formula. Design and operation of the flare are described.

21075 APTIC NO. 40379

Socher, Hermann and Guenter Walter

PLASTICS IN THE REFUSE - A DANGER FOR THE ENVIRONMENT? A CRITICAL CONSIDERATION CONCERNING PROBLEMS OF REMOVAL OF PLASTIC WASTES. *(Kunststoffe im Muell - Gefahr fuer die Umwelt. Eine kritische Betrachtung des Problems der Beseitigung von Kunststoffabfaellen). Text in German. Muell Abfall, 4(2):58-60, April 1972.*

The critical problem of disposing of plastic wastes has not yet been answered satisfactorily. Incineration poses the problem of emission of harmful gases. Polyvinylchloride produces gaseous hydrochloric acid when burned and polyurethane forms nitrous gases and ammonia. Mercury and lead components deriving from additives in the plastics remain in the flue gases and may cause harmful environmental effects. These substances also cause corrosion in the boiler of the incineration plant, although this effect can be controlled by technical methods. Other plastics, however, produce only water and carbon dioxide when burned, and therefore be preferred in the future.

21076 APTIC NO. 40043

Sommers, Hans, Heinz Bathke, and Otto Menzel

MEASUREMENTS OF THE OXIDES OF NITROGEN AT THE BOILER OF A CENTRAL HEATING PLANT. *(Stickoxidmessungen an den Kesselanlagen einer Heizzentrale). Text in German. Gas Wasserfach, Gas Erdgas (Munich), 113(1):19-26, Jan. 1972. 10 refs.*

In a central heating plant with four boilers with a total capacity of 4.8 G cal/hr, the concentration of the oxides of nitrogen was measured. At the time of the measurements two boilers were in operation. Three of the boilers are low-pressure boilers and one is a high-pressure boiler with a separate stack. The waste gases of the three low-pressure boilers leave via a common 9.5 m stack. The waste gas samples for the emission measurements were taken by means of a quartz probe over a period of almost 3 months. Toward the end of the measurement period, analyses by the Saltzman and the phenoldisulfonic acid methods were performed for comparison. The wind direction and wind velocity were also measured. The NOx emissions were determined indirectly by calculation of the dilution of the waste gas plume. The emission measurements yielded an average NOx concentration in the waste gas of 34 ppm, about 100 g NOx/G cal. At full load somewhat lower values were measured (90 g NOx/G cal) than at partial load (110 g NOx/G cal). The influence of the fuel/air ratio, which was varied within narrow limits, could not be observed. The NOx emission concentrations were calculated to reach a maximum of 0.21 mg/cu m at a wind velocity of 3.5 m/sec at building I and of 0.33 mg/cu m at 1.45 m/sec. All values were below the maximum allowable long-term emission concentration of 1 mg NOx/cu m.

21077 APTIC NO. 40619

Souza, Anthony F.

A STUDY OF AIRCRAFT POWERPLANT EMISSIONS. (FINAL REPORT). *Scott Research Labs., Inc., Plumsteadville, Pa., Environmental Protection Agency Contract 68-04-0037, SRL-1244-14-1171, 270p., Jan. 3, 1971. 3 refs.*

NTIS: PB 207107

The emissions of carbon monoxide, carbon dioxide, hydrocarbons, nitrogen oxides, and aldehydes were monitored in order to provide a statistical data base for aircraft power plant emissions needed for the rational establishment of mass emission standards. Piston engines and turbine engines were studied. Comparison of exhaust emissions from turbine and piston engines on a pound/pound of fuel basic shows that carbon monoxide from turbines was 10 times less at idle and about 400 times less at load than piston engines. At idle, hydrocarbons from turbines were about the same as from carburetor piston engines but several times lower than from fuel-injected piston engines. At loaded conditions, turbines were 50 times lower in hydrocarbons. Nitrogen oxides from turbines were five times greater at idle than piston engines and twice as great at load. Aldehyde emissions were somewhat higher in turbines at idle and lower than piston engines at load.

21078 APTIC NO. 40793

Spangler, Carl V. and George M. Duggan

SIOUX FALLS, SOUTH DAKOTA METROPOLITAN AREA AIR POLLUTION EMISSION INVENTORY. *Air Pollution Control Office, Durham, N. C., Div. of Air Quality and Emission Data, Office of Air Programs Pub-APTD- 0832, 60p., Jan. 1971. 7 refs.*

NTIS: PB 207751

Estimates are provided of total emissions of oxides of sulfur, oxides of nitrogen, hydrocarbons, carbon monoxide, and particulate matter. The emissions of these pollutants are delineated with respect to source type, season of the year, and geographical distribution. Source categories considered were stationary fuel combustion, transportation, solid waste disposal, industrial processes, and evaporative losses. Facilities that emitted large quantities of air pollutants were considered individually. An estimated 136,500 tons of the five major pollutants were emitted in the area in 1969, ranging from 97,100 tons of carbon monoxide to 3700 tons of sulfur oxides. The two steam-electric plants located in the area contributed 62% of the sulfur oxides and 52% of the particulates. Transportation sources accounted for 16% of the sulfur oxides, 24% of the particulates, 90% of the carbon monoxide, 59% of the hydrocarbons, and 56% of nitrogen oxides. Open burning of refuse was responsible for 16% of particulates, 38% of hydrocarbons, and 21% of nitrogen oxides.

21079 APTIC NO. 39817

Springer, Karl J.

EMISSIONS FROM A GASOLINE- AND DIESEL-POWERED MERCEDES 220 PASSENGER CAR. *Southwest Research Inst., San Antonio, Tex. Vehicle Emissions Research Lab., Air Pollution Control Office Contract CPA-70-44, Rept-AR-813, 56p., June 1971. 13 refs.*

NTIS: PB 203994

Odor, smoke, and gaseous emissions from a Mercedes passenger car powered by a four-cylinder diesel engine were measured with methods developed for heavy-duty diesel trucks and buses. In addition, comparative tests of the diesel vehicle and a four-cylinder Mercedes gasoline engine were made using the 1972 Federal Emissions Test Procedure for carbon monoxide, hydrocarbons, and nitrogen oxides. Under certain driving conditions, the diesel odor was as intense as that from an old style injector-equipped, two- stroke engine bus. Hydrocarbons, acrolein, and aldehydes correlated well with odor ratings, and were also indicative of old diesel buses under intense odor conditions. Federal cycle smoke was on the order of 10% (a and b factors). The results of the 1972 test procedure showed that the diesel produced about 30% as much hydrocarbons, 5% as much as CO, and about 50% as much nitrogen oxides as the gasoline engine. Partial oxygenates such as acrolein, aliphatic aldehydes, and formaldehyde were substantially lower for the diesel. Since only one diesel and one gasoline car were studied, extrapolation of the results to all Mercedes diesel and gasoline engines is not justified.

21080 APTIC NO. 40041

Swatosh, James J. Jr. and Arne H. Wiederman

NUCLEAR WEAPONS EFFECTS: DUST AND AIR TEMPERATURE ENVIRONMENT. *IIT Research Inst., Chicago, Ill., Office of the Chief of Engineers Contract DACA-73-67-C-0018, TM-S-2, 279p., Feb. 1971. 17 refs.*

NTIS: AD 729426

The dust and air temperature environment resulting from nuclear detonation can be calculated by a computer program. The program can accommodate a wide variety of weapons detonations and ground surfaces. A weapons effects subroutine limits battle environment input data to the bare minimum. Dust concentrations can be calculated at any significant range from ground zero and at any height to which dust is raised by blast wind erosion of soil and subsequent air transport. The soil may be considered either uniform or variable in the path of the blast wave. Soils are specified by particle size and terminal velocity, size distribution, and erodable depth. Land use is accounted for. The topography is assumed to be flat or gently rolling. Multiple burst dust concentrations can be computed for variously timed detonations. The effect of prevailing winds is introduced after cessation of blast winds. Air temperature is treated as a dust-related phenomenon. The ground, heated by thermal radiation prior to arrival of the air blast, is eroded and transported by the blast wind. Its heat is transferred to air, primarily by convection, until thermal equilibrium is attained. The dust present from preceding bursts acts as a heat shield, transmitting only a portion of thermal radiation from succeeding bursts. The computer program output has also been designed as input to a hardened air intake and exhaust gas systems computer program. (Author abstract modified)

21081 APTIC NO. 40176

Swithenbank, J.

ECOLOGICAL ASPECTS OF COMBUSTION DEVICES (WITH REFERENCE TO HYDROCARBON FLARING). *Am. Inst. Chem. Engrs. J., 18(3):553-560, May 1972. 4 refs.*

The fundamental factors controlling the emission of pollutants by a flare combustion system are fuel/air ratio controlling smoke and radiation, maximum flame temperature controlling nitric oxide formation, combustion quenching controlling aldehydes, and burner turbulence controlling noise. The parameters which determine the performance of the injector system are area ratio, density ratio, and steam pressure (if used). If steam is used to provide the critical amount of combustion air, then steam/fuel consumption will be better than 0.5 (by mass). Steam or fuel jet noise can be a problem when high pressures are used. The production of turbulent combustion noise has been analyzed quantitatively and related to the physical variables. Fuel type and mixture ratio only affect the burner noise output by about 5 db for typical hydrocarbons. The dominant factor is burner turbulence velocity which can be controlled to decrease the combustion roar by up to 20 db. Safety and burner cost considerations lead to the current use of simple flare tips. These, however, can easily form aldehydes, smoke, noise, and other pollutants and the eventual use of more technically sophisticated low pollution units is inevitable. (Author summary)

21082 APTIC NO. 40182

Takahashi, Noboru

ENVIRONMENTAL POLLUTION BY METAL INDUSTRIES. *(Kinzoku sangyo ni yoru kankyo osen). Text in Japanese. Kagaku (Science), 41(10):551-556, Oct. 1971.*

Iron works produce mineral powder and coke powder as particulates and sulfur dioxide. More than 50% of the SO2 is from the sintering process. By an approximate calculation, a plant with a capacity of annual production of 1000 tons crude steel produces 7,000,000 cu m SO2 every year. The SO2 gas from an iron works also contains extremely poisonous arsenic trioxide. The same plant discharges about 2400 tons of waste water yearly. Casting industries generate approximately 6000 tons of particulates yearly, of which about 50% are silicon dioxide. In zinc production industries, cadmium is generated since its contamination in zinc mineral is approximately 0.25%. It is discharged as dust into air and as waste in waste water. In aluminum refining, fluorides are generated, and for a production of 1 ton aluminum about 20 to 30 kg of fluorine are also produced as fluorides. Cyanides are largely used in metal gilding and thermal treatment, approximately 50% for the former and 30% for the latter. These cyanides, accompanied with cadmium, have been the major pollutants in the rivers in large cities.

21083 APTIC NO. 40457

Tichatschke, J. and U. Kowalczyk

STUDY OF THE RELATIONSHIP BETWEEN REFUSE AND FLUE GAS COMPOSITION. *(Untersuchung der Beziehungen zwischen Muell- und Rauchgaszusammensetzung). Text in German. Mitt. Ver. Grosskesselbetr., 52(2):149-152, April 1972. 1 ref.*

At the combustion of refuse with excess air, a flue gas develops which contains mostly nitrogen, oxygen, carbon dioxide, and water vapor. Sulfur dioxide and hydrogen chloride develop in quantities of 0.05 to 0.09% by vol. In order to determine the fuel/air ratio (lamda), the 02 concentration must be known as well as the ratio of dry flue gas volume which develops at the combustion to dry air quantity which is theoretically required for the combustion. If this ratio is 1, lamda becomes a direct function of the 02 concentration in the flue gas. This is the case only if all carbon is burned completely. Practical examples have shown that lamda can be determined with sufficient accuracy in each individual case by assuming the ratio to be one. When lamda is known, the maximum CO2 concentration in the flue gas can be calculated with the measured CO2 concentration. With a sufficiently large number of flue gas analyses, the polyvinyl chloride content in the refuse can be determined by approximation from the hydrogen chloride concentration. The following parameters must be known, fuel to air ratio, specific flue gas volume of the combustible matter, combustible matter in the refuse, and flue gas analysis (HCl, O2).

21084 APTIC NO. 40063

Tsuchiya, Gordon and Lennart N. Johanson

PREDICTION OF GENERATION AND RELEASE OF ODOROUS GASES FROM KRAFT PULP MILLS. *Tappi, 55(5):777-783, May 1972. 24 refs. (Presented at the Technical Association of the Pulp and Paper Industry, Annual Meeting, New York, N. Y., Feb. 16-19, 1970.)*

Industrial measurement of the concentration and quantity of odorous gases released in kraft mill operation is often difficult, costly, and of uncertain reliability. To supplement such measurements, a study has been made of the expected release of volatile constituents from a typical kraft mill utilizing a continuous digester. Constituents considered include hydrogen sulfide, methyl mercaptan (methane thiol), methyl sulfide, dimethyl disulfide, alpha-pinene, and alpha-terpineol. Consideration was given to the amount of terpenes occurring in the wood, the kinetics of generation of methyl mercaptan and methyl sulfide, the vapor-liquid equilibrium of each compound in the presence of water, the influence of pH on the volatility of hydrogen sulfide and methyl mercaptan, and the influence of oxidation system efficiency. Results are in qualitative agreement with most mill measurements available. The terpenes and methyl sulfide are released early in the recovery cycle. The release of hydrogen sulfide and methyl mercaptan is greatly dependent upon oxidation efficiency and upon pH. Under unfavorable circumstances, appreciable quantities of these constituents may appear in the evaporator condensates and vapors from direct-contact evaporators. (Author abstract)

21085 APTIC NO. 40143

Tsuji, Masahiko, Toshihide Okuno, and Watahiro Takada

INVESTIGATION ON THE COMPONENTS OF OFFENSIVE ODOR DERIVED FROM FISH BONE TREATMENT FACTORY. *(Gyochokotsu kaseijo yori hasseisuru akushu seibun chosa). Text in Japanese. Hyogo-ken kogai Kenkyusho Kenkyu Hokoku (Rept. Public Nuisance Res. Hyogo Prefect., no. 3:18-20, 1972. 3 refs.*

Main odor components at two fish bone treatment factories (A and B) were studied. The main source of odor at both factories was the rotary drier. The deodorizing method at factory A was flushing and that of factory B was ozone acidation. Effluent gas from the rotary drier of A factory and the air at the 20 m, 120 m, 180 m, and 300 m leeward of the drier, were collected using 1-liter vacuum jars, condensed at low temperature, and analyzed by gas chromatography. The wind velocity and air temperature were 1 m/sec and 2-3 C at factory A and 3-5 m/sec and 0-1 C at factory B. The main odor components at factory A were amine compounds; their concentrations were 0.005-0.062 ppm 20 m away from drier, 0.003-0.095 ppm at 120 m, 0.01-0.335 ppm at 180 m, and 0.005-0.400 ppm at 300 m. The amine odor components at factory B were amine and aldehyde; the concentrations of amine compounds were 0.005-0.068 ppm at the 100 m point, 0-0.057 ppm at the 200 m point, and 0-0.063 ppm at the 300 m point; concentrations of aldehyde compounds were 0.011-0.056 ppm, 0.007-0.098 ppm and 0.009-0.020 ppm, respectively. Although the concentration of amine-aldehyde compounds around the factories were low, the odor was perceived. Diethylamine was detected as the common odor at those factories.

21086 APTIC NO. 40390

Upmalis, A.

REFUSE INCINERATION IN HOSPITALS. *Muell- und Abfallverbrennung in Krankenhaeusern). Text in German. Gesundh. Ingr., 93(4):97-101, April 1972.*

The difficulties in incinerating hospital refuse, which amounts to 4 kg per bed and day, results from the variety of the refuse ranging from packing material, surgical cotton, and garbage to even animal carcasses. Since this refuse cannot be presorted the incineration equipment must be very effective. Mechanical transfer grates have satisfactorily met the requirements. The equipment consists of several inclined combustion sections formed by movable and fixed bars mounted onto two water-cooled grate beams. Two bulges in each grate bar form a hollow space in which burning refuse nests provide for the ignition from below of the material to be burned. At the same time ignition is effected by means of the fire-room radiation. This double ignition provides for the complete combustion even of combustion-resistant material. By means of the movable bars the burning material is pushed stepwise down the inclined grate section. This special construction avoids crust formation and inhomogeneous combustion. Corrosion problems in the transfer grates can be avoided by correct control of combustion and by not over-charging the grate. Thus, when the grate is correctly operated the formation of reducing gases is minimized. Even in case of hydrochloric acid produced from the incineration of polyvinyl chloride, no corrosion problems will arise.

21087 APTIC NO. 40454

Vogh, James W.

CONTRIBUTION OF SOME CARBONYL, PHENOL, AND HYDROCARBON COMPONENTS TO DIESEL EXHAUST ODOR. *Bureau of Mines, Bartlesville, Okla., Bartlesville Energy Research Center, RI-7632, 11p., 1972. 12 refs.*

The initial findings in an experimental program to identify diesel exhaust odorants and determine their contributions to diesel odor are presented. The compounds were isolated from the exhaust stream and separated into groups by chemical and physical means to prepare them for odor evaluation. The samples were then rated for odor intensity and quality by techniques that allowed determination of the level of contribution to the total odor. Results were obtained for those carbonyls and phenols that could be isolated from exhaust through intermediate conversion to oxime derivatives. Unsaturated aliphatic aldehydes and sterically hindered carbonyls were not included. Hydrocarbons intermediate in the diesel range were also evaluated and an odor contribution was found from those of the aromatic group. The evaluated carbonyls, phenols, and hydrocarbons account for about 20% of the total odor in exhaust from an indirect-injection engine during idle. For exhaust from the indirect-injection engine operating under load and from a direct-injection engine at no load, these compounds were found to have no significant odor levels. (Author abstract modified)

21088 APTIC NO. 40459

Weber, Paul

REFUSE INCINERATION - MAIN PROBLEM OF THE 20TH CENTURY. *(Abfallbeseitigung - Das Hauptanliegen des 20. Jahrhunderts). Text in German. Textilveredlung (Basel), 7(5):334-335, May, 1972.*

A new incinerator has been developed for refuse with a heating value between 2000 and 4500 kcal/kg. The refuse is fed into a bin and is then led onto the drying grate by means of a feeding piston. From there it is transported onto the incineration grate provided with hydraulically operating poking pistons and stirring devices. The slag is transported into a slag bin by means of a conveyor. Flue gas cleaning equipment reduces the harmful emissions under the legal tolerances. A fan system blows the flue gases through the whole incineration plant and emits them through a chimney into the air. The heat is used in a waste heat boiler.

21089 APTIC NO. 40583

Wells, A. E.

CONDITIONS IN AND AROUND THE SELBY SMELTER AND THE SELBY SMOKE ZONE. *Bull. Bureau Mines, no. 98:63-81, 503-520, 1915. 86 refs.*

Dusts, fumes, and gases from metallurgical furnaces at the Selby Smelter, Contra Costa, California, were measured and analyzed. The furnaces were those in the roasting department, smelting department, lead refinery, and gold and silver refinery. Also studied were the effects of general wind conditions and topography on contaminant dispersion in and around the smelter and the Selby smoke zone. The only uncontrolled contaminants during the investigation were the dust and fumes from roasters during part of the period and the sulfur dioxide from the roasters during the whole period. Lead and arsenic-containing dust and fumes from roasting furnaces eluded baghouse control due to improper cleaning of bags and accidental placement of a damper in the flue. Amounts of sulfur dioxide produced by roasting furnaces were variable and depended largely on the charge and operating conditions. To a degree not usual around most smelters, all natural conditions in the Selby smelter area tend to retard the dispersion and diffusion of smelter emissions, making them more concentrated over the smoke zone than would be expected. Thus, even small amounts of SO2, dust, and fume pose a serious problem.

21090 APTIC NO. 39831

Wolman, Abel

EFFECTS OF IONIZING RADIATION IN AIR POLLUTION. *Interdepartmental Committee on Air Pollution, Washington, D. C., Air Pollut., Proc. U. S. Tech. Conf., Washington, D. C., 1950, p. 489-492. (May 3-5, Louis C. McCabe, ed.)*

Discharge of toxic and radioactive materials into the atmosphere from atomic energy operations are decreasing because of corrective measures taken by the Atomic Energy Commission since 1947. Absorption of iodine(131) by vegetation raised the question of exceeding permissible tolerances of I(131) in vegetation which might limit its grazing potential. Removal of I(131) by chemical scrubbing was instituted to solve this problem. The accidental contamination of cooling air and the results of unsatisfactory dissolving or separation operations led to cleaning all ventilating air entering such processes and interposing scrubbers, filters, and precipitators to prevent contamination of the gaseous effluents reaching the outside atmosphere through the stacks. Increasing attention is being given to the monitoring of stacks. Some general agreement is desirable with respect to permissible limits for human and lower animal exposure to radioactive contamination of the atmosphere. Current best estimates of maximum permissible doses of inspired air are given for I(131), argon(41), carbon(14), and xenon(133).

21091 APTIC NO. 40509

Wouk, Victor

ELECTRIC CARS: THE BATTERY PROBLEM. *Bull. At. Sci., 27(4):19-22, April 1971.*

There is no known battery development work that justifies hope for the complete replacement of the heat engine powered automobile by the battery powered vehicle in less than 30 years. The heat engine/battery hybrid (HEBAH) is suggested as a means of reducing automobile emissions in the meantime. This is an electric vehicle, using an electric motor and batteries to drive the vehicle. A small heat engine is used to operate an electric power-generating device which recharges the batteries. This approach will reduce emissions by at least 50% in comparison with conventional automobiles of equal performance. A schematic diagram shows the simplified, or series, HEBAH in which the engine turns a generator, electric power flows through the generator to the batteries when needed, and to the motor if needed. There is also a parallel approach where the engine is coupled mechanically to the wheels through a transmission. The electric motor is used only to supply additional power during acceleration and to absorb energy during regenerative braking, charging the batteries. Calculations indicate that the emissions of such a vehicle may be less than 25% of a vehicle with equivalent performance and conventional design.

21092 APTIC NO. 40677

Yamaki, Naoomi

AIR POLLUTION BY AUTOMOBILES AND ITS CONTROL. *(Jidosha taiki osen no genjo to sono taisaku). Text in Japanese. Mitsubishi Sekiyu K. K. Gijutsu Shiryo (Tech. Rev., Mitsubishi Oil Co., Ltd.), 20(1): 66-82, Nov. 1971. 16 refs.*

Carbon monoxide, photochemical smog, and lead pollution are discussed as important air pollutants in Japan, referring to environmental standards. Emission quantities by sources and load ratio are presented by a table. According to the 1967 records, 874,000 tons of CO were emitted from automobiles, 1000 tons from factories and power plants, and 2000 tons from airplanes. The ratios were 99.7%, 0.1%, and 0.2% respectively. 35.9% of the nitrogen oxides came from automobiles 63.5% from factories and electric power plants, and 0.6% from airplanes. The total nitrogen emission was 178,000 tons. The total hydrocarbon emission was 185,000 tons, of which 97.1% came from automobiles, 1.6% from factories and power plants, and 0.5% from airplanes. Of the 460,000 tons of sulfur oxides emissions, 1.0% came from automobiles and 99% came from factories and power plants. Characteristics, damages, and the formation mechanism of photochemical smogs were studied. The relationships of oxidant and the concentration of hydrocarbons and nitrogen oxides were analyzed on the basis of data from main cities of the United States. Exhaust manifold reactors, catalytic converters, and recirculation of exhaust gas are discussed as positive technical improvements for the future. Fuel improvements and non-lead gasoline are also discussed.

21093 APTIC NO. 40222

Zimmerman, R. E.

THE ATMOSPHERIC POLLUTION PROBLEM OF MINE REFUSE PILES. *Interdepartmental Committee on Air Pollution, Washington, D. C., Air Pollut., Proc. U. S. Tech. Conf., Washington, D. C., 1950, p. 73-83. 8 refs. (May 3-5, Louis C. McCabe, ed.)*

Piles of coal mine refuse (culm in anthracite fields, gob in bituminous fields) generally contain carbonaceous matter and sulfur, and usually highly combustible, and frequently catch on fire, mainly through spontaneous combustion, with consequent severe air and water pollution effects. Sulfur appears to speed up the firing of the piles, and its combustion products cause the most damage. Sulfur occurs in these piles as iron sulfides (the largest proportion), organic sulfur, and sulfate sulfur. Iron sulfides probably oxidize to ferrous sulfate. If the deposits of free sulfur that often occur on the surfaces of refuse piles burn, then highly corrosive sulfuric acid ultimately is formed, polluting streams and adding greatly to the prevalence, persistence, and acrid conditions of fogs encountered in industrial areas. Methods of piling mine refuse to discourage combustion are discussed; these are affected by cost, terrain, mine conditions, and characteristics of the refuse. Methods of preventing fires are being studied, including one which combines layer piling, packing, and sealing with clay. In general, some method of sealing is necessary to prevent sufficient oxygen from permeating through the pile to support combustion. Utilization of mine refuse, for example to recover pyrite or low-grade coal or for paving or building material, offers additional possiblities.

CONTROL METHODS

21094 APTIC NO. 39950

DEVICE FOR THE MECHANICAL AND CHEMICAL NEUTRALIZATION OF EXHAUST GASES FROM INTERNAL COMBUSTION ENGINES. *(Dispositif pour la neutralisation mecano-chimique des gaz d echappement de moteurs a combustion interne). Text in French. (Pragopropag Druzstvo Propagacnich, Kulturnich a Obchodnich Sluzeb (Czechoslovakia)) French Pat. 2,053,692. 6p., April 5, 1971. (Appl. July 15, 1969, 5 claims).*

A device for the mechanical and chemical neutralization of exhaust gases from internal combustion engines is described. The exhaust gases from the exhaust pipe are first led through a coke filter where the major part of the tar, smoke and condensate is separated. The exhaust is then conveyed by asymmetric, silverplated pipes to a turbine which rotates in a basic solution. This treatment is followed by the separation of the liquid particles, and then the exhaust flows through another turbine which rotates in an acid solution. Final oxidation of unburned gases is provided by air injections before the exhaust is released into the atmosphere. Both turbines are driven by the exhaust gas. The above procedure has the advantages of being simple, relatively inexpensive, and reliable.

21095 APTIC NO. 39951

PROCEDURE FOR THE SEPARATION OF CARBON DIOXIDE AND HYDROGEN SULFIDE FROM GASES. *(Procede pour separer des gaz le CO2 et H2S qu ils contiennent). Text in French. (Badische Anilin- und Soda Fabrik A. G., (West Germany)) French Pat. 2,053,289. 5p., April 16, 1971. (Appl. July 29, 1970, 1 claim).*

An effective method for the separation of carbon dioxide and/or hydrogen sulfide from gases is described, where an organic solvent scrub is under normal or increased pressure, and the solvent is regenerated by expansion or/and heat supply. Alcoxyethylmethyl acetones such as isobutoxyethylmethylacetone are used as a solvent, with a water content of about 1%. Such solvents have the advantage of possessing minimum corrosivity for steel in the presence of carbon dioxide and hydrogen sulfide. The separation is made in the usual manner, preferably in counterflow, and single or multi-stage regeneration can be applied.

21096 APTIC NO. 39958

SULFUR FROM SOUR REFINERY GASES. *Petrol. Process., 4(8):891-892, Aug. 1949. 1 ref.*

Equipment and operating experiences are described for a method of by-product sulfur recovery in which hydrogen sulfide is extracted from sour gases in refineries adjacent to a new sulfur plant. The H2S is absorbed in diethanolamine (DEA) at the individual refineries, and the H2S-rich DEA solution then returned to the chemical plant through pipelines. At the chemical plant it is steam-stripped to remove H2S and the regenerated DEA solution pumped back to the refineries for re-use. The H2S is converted to sulfur by a modified Claus process, in which part of the H2S is burned to sulfur dioxide, which is then reacted with the unconverted H2S to yield elemental sulfur of 99.8% purity. (Author abstract modified)

21097 APTIC NO. 40004

HIGHLY EFFICIENT FUME CONTROL SYSTEM CHECKS PICKLING EXHAUST VAPORS AT REPUBLIC. *33 Mag., 10(3):50-51, March 1972.*

Hydrochloric acid for steel pickling is faster and more effective than sulfuric acid. The exhaust vapors from the pickling operation contain hydrogen chloride and are an air pollution problem unless cleaned up. A four-pass chamber scrubber is described that handles 35,000 cu ft/min pickling exhaust vapors at 98% efficiency, removing 80 lb/hr of hydrogen chloride with 0.0002 gal/1000 cu ft liquid entrainment in the exhaust. Performance of the unit is superior to a packed tower scrubber.

21098 APTIC NO. 40086

CUPOLA AFTER-BURNING DEVICE EMPLOYS OIL-FIRING. EXPERIMENTAL WORK PREVENTS EMIS-

SION OF DARK FUME. *Foundry Trade J. (London), 126(2717):12-15, Jan. 2, 1969.*

The results are given of tests conducted to determine whether foundry cupola stack emissions could be reduced by using an oil burner above the charge. Combustion could be initiated and maintained in the cupola stack with a correctly-positioned burner that has a high jet-momentum to penetrate the rapidly moving waste gas stream and that incorporates a short flame to avoid damage to the cupola shell. The provision of a continuous flame in the cupola considerably reduces the visible emission from the stack terminal. Economic analysis indicates that the outlay for the oil burner and ancillary equipment should be recovered within a relatively short time period. The replacement of the additional coke required to maintain flame in the cupola stack by oil fuel shows a considerable financial benefit in favor of oil. (Author conclusions modified)

21099 APTIC NO. 40093

(Inventor not given.)

DEVICE FOR THE RECIRCULATION OF LEAKING CRANKCASE GASES IN INTERNAL COMBUSTION ENGINES. *(Dispositif de recirculation des fuites de gaz dans le carter d un motoeur a combustion interne ou analogue). Text in French. (Nissan Motor Co., Ltd. (Japan)) French Pat. 2,054,153. 18p., April 5, 1971. (Appl. July 3, 1970, 14 claims).*

The invention is concerned with a device for the recirculation of crankcase gases into the engine, where the recirculation is interrupted during periods of idling and deceleration to minimize unburned hydrocarbons in the exhaust during such periods. This is made possible by a flow regulator such as a check valve, inserted in the crankcase gas recirculating line, which is operated according to the angular position of the butterfly valve or the velocity of the automobile or both. The crankcase gas recirculating line is opened and closed by the flow regulator which is mechanically connected to the butterfly valve, according to the electromagnetically detected parameters. The above device, controlling the crankcase gas flow to the fuel distributor system, can be applied for carburetor, injection, and other types of engines.

21100 APTIC NO. 40094

National Research Council, Washington, D. C., Ad Hoc Panel on Abatement of Nitrogen Oxides

ABATEMENT OF NITROGEN OXIDES FROM STATIONARY SOURCES. *Office of Air Programs Contract CPA 70-48, Rept. APTD-0982, Rept. COPAC-4, 62p., 1972. 48 refs.*

NTIS: PB 208100

This report assesses current control technology for the abatement of nitrogen oxides emissions from stationary sources and what will be reasonably achieved in the near future. About 53% of manmade nitrogen oxide emissions in the U. S. are from stationary sources, primarily from fossil-fuel-fired boilers of electric utilities and from industrial furnaces; the remainder is emitted by vehicles. The NOx emissions from combustion sources can be lowered by reducing the amount of oxygen in the flame zone and by reducing the peak flame temperature. Reduction of NOx concentration to about 100 ppm is a realistic objective by 1980 for new plants using natural gas and to 150 to 200 ppm for oil-fired plants; little has been done with coal-fired units. The most promising prospects for significant early reduction of NOx in fuel-consumption stack gases lie in the application of some combination of combustion-modification processes to reduce the NOx formed. The probability for removal of NOx from stack gases is not encouraging.

21101 APTIC NO. 40103

CHRYSLER S WINFIELD FOUNDRY SOLVES POLLUTION PROBLEM. *Foundry, 97(9):162, 167-169, Sept. 1969.*

A dust collection system designed to solve foundry air pollution problems caused by a high oil content in the charge material and by continuous charging and casting methods is described. From a furnace hood that covers the entire melting area, hot gas and smoke are drawn upward through conducting pipes to the dust filtering system located outside the plant and adjacent to the melting area. Two eight-compartment units, each having 736 filtering dacron multibags with a combined filtering area for both units of 66,240 sq ft, are used in conjunction with the system to filter the air. The design operating temperature of the bags is 275 F. A fire protection system for the dust collecting equipment, procedures for cleaning the filters, and automatic controls are described. The system was designed to handle a 30% increase in foundry capacity without efficiency loss. Foundry effluents contain .008 lb dust/1000 lb air, well within the local emission standard of .10 lb dust.

21102 APTIC NO. 40107

KILLING ODORS BY CHEMICAL REACTION. *Chem. Week, 89(10):125-126, Sept. 9, 1961. 2 refs.*

Chemical process plants with sulfide odor problems may be able to kill these smells by catalytic oxidation in open air. An oxidation technique reportedly successful for hydrogen sulfide, methyl mercaptan, and other alkyl mercaptans contained in stack gases from a kraft sulfate paper mill and an oil refinery is discussed. The key to the method is a product called Alaxol SRM, which is said to be a mixture of inorganic and organic compounds. When added to stack gases it speeds up the oxidation of reduced sulfur compounds. Eliminating odor by chemical reaction instead of counteraction. Evaluation of the technique, costs and concentrations, and masking and counteragents are considered.

21103 APTIC NO. 40113

National Industrial Pollution Control Council, Washington, D. C., Process and Systems Engineering Sub-Council

MAINTAINING VEHICULAR EMISSION CONTROL SYSTEM INTEGRITY. *13p., March 1971.*

GPO: 431-996/248

Non-uniformity of production engines and deterioration of cars in service are important factors which have a bearing on air quality. Satisfactory uniformity of emissions must be obtained by extensive application of established quality control techniques to new cars leaving production lines. Programs for used car testing should be expanded so that realistic deterioration data may be developed for use in formulating future emission standards. Some states are considering inspection for vehicle emissions in order to provide effective enforcement of air standards. The intensity of such state inspection of cars should vary with location. For instance, in high pollution areas more severe control measures are warranted. But confusion can arise because air quality regions sometimes embrace states having different enforcement policies and techniques. Therefore, cooperation between neighboring states and standardization of test procedures should be encouraged. Federal emission standards for cars and trucks are mentioned. (Author summary modified)

21104 APTIC NO. 40244

CHEMICAL SPRAY STOPS DUST AT CRUSHING PLANT. *Roads Streets, 119(2):78, 80, Feb. 1971.*

A chemical spray system is controlling dust at a Hawaiian crushing plant where a production rate of 750 tons of crushed stone per hour and prevailing winds blowing toward densely populated areas were creating severe dust problems. The first automatically controlled application of the Compound MR solution occurs at the feeder discharge as the material is fed over the scalping screen. The material is treated again at the crusher mouth and crusher discharge. The final application takes place on the conveyor belt taking stone to the screens. All but the last of these are arranged to treat the material while it is airborne, offering maximum surface exposure. A gallon of MR compound is mixed with 1000 gal of water, 1.5 gal of this solution are used per ton of stone. The MR surfactive agent wets and forms clots of dust particles.

21105 APTIC NO. 40255

EXHAUST GAS COOLING AND DEDUSTING IN AN IRON SPONGE PLANT IN SOUTH AFRICA. *(Abgaskuehlung und Entstaubung an einer Eisenschwammanlage in Suedafrika). Text in German. Stahl Eisen (Duesseldorf), 92(9):423, April 29, 1972.*

The exhaust gas of an iron sponge plant in South Africa exists from the rotary shaft furnace at a temperature of 600 to 700 C and is cooled down to 140 C in four gas coolers. From there the gas is led into two filters where the dust settles at the walls of 400 hose-like filter elements. The clean gas is driven into the open air by a fan. A short compressed air stream of 6 atm blows the dust from the hose filters into the dust collector from where it is removed by means of chains. The plant discharges 4 tons of dust per hour.

21106 APTIC NO. 40258

SEPARATOR FOR CHROMIC ACID MIST. *(Abscheider fuer Chromsaeurenebel). Text in German. Chem. Ind. (Duesseldorf), 24(9):229, April 1972.*

A new separator has been developed for recovering chromic acid from the mist which forms during the chrome-plating of metal parts. The chromic acid mist is led into a casing with two lines of drop separator profiles made of polyvinyl chloride. The liquid particles settle at these profiles and are led downward A separation of 99.9% is achieved.

21107 APTIC NO. 40262

EMISSION-REDUCING HOT INJECTION NOZZLES. *(Umweltfreundliche Heisseinspritzdusen). Text in German. Motortech. Z. (Stuttgart), 33(5):222, May 1972.*

Pulverized iron carbide fibers are used for the production of fuel injection nozzles. The nozzles are heated electrically for the time the engines runs or until the engine is warm. An extremely large total surface for the heat exchange is achieved so that the fuel is atomized with a degree of efficiency that has not been achieved by any other means. The result is the total elimination of carbon monoxide from the exhaust gas. In the U. S. the manufacture of iron carbide fibers is extremely expensive. In Germany a different production method has been found (the fibers are composed of many crystals while in the U. S. they are single-crystal fibers) which is less expensive ($31./kg fiber vs., $3100./kg fiber in the U. S.) and permits production in higher quantities. The polycrystalline iron carbide fibers are produced in diameters of 1/2000 to 1/20 mm and 10 mm long.

21108 APTIC NO. 40371

DIESEL ENGINES CONTAINING LESS HARMFUL SUBSTANCES IN THE EXHAUST GAS BY MEANS OF TWO-PHASE COMBUSTION. *(Abgasfreundliche Dieselmotoren durch zweistufige Verbrennung). Text in German. VDI (Ver. Deut. Ingr.) (Berlin), 26(19):5, May 1972.*

A new two-phase combustion for Diesel engines has been developed which reduces exhaust gas emissions to such extent that they already meet the severe limits prescribed in the U. S. for 1975. In the first phase a reducing atmosphere is maintained in the hot turbulence by high pressure and lack of oxygen in order to reduce the formation of nitrogen oxides. Post-combustion is effected in the second phase at low pressure and low temperatures which also reduce the development of nitrogen oxides. A surplus of air and strong turbulence provide for nearly complete combustion of carbon monoxide and soot. Prices for the new engines will remain unchanged; however, they require 10% more fuel and there is a 7-8% power loss.

21109 APTIC NO. 40497

POLLUTION CONTROL AGREEMENT. NO. 5, KANAGAWA PREFECUTRE, YOKOHAMA CITY, KAWASAKI CITY, AND NIHON KOKAN KEIHIN REFINERY POLLUTION CONTROL AGREEMENT. *(Kogai boshi kyotei (5) Kanagawa-ken, Yokohama-shi, Kawasaki-shi to Nihon Kokan (kabu) Keihin seitetsujo no kogai boshi kyoteisho). Text in Japanese. Kogyo Ricchi (Ind. Location), 10(8):51-53, Aug. 1971. (Includes POLLUTION CONTROL AGREEMENT BETWEEN ONE-PREF-TWO CITIES AND THE STEELWORKS: WILL THE WHITE CLOUDS RETURN TO THE SKY OF THE AREA? (Ikken nishi tai kokan kogai boshi kyotei - fukugen naruka, chiiki no sora no shiroi kumo). Text in Japanese. Toshi Kaihatsu (Urban Development), 1971:82-84, Nov. 1971.)*

With the proposed move of Nihon Kokan (Japan Steel Pipe Industries) Kawasaki Refinery to the landfilled Ogi Island in Tokyo Bay, Kawasaki and Yokohama cities are expected to be victimized by the refinery s pollution more than ever. Agreements were signed between Kanagawa Prefecture, Yokohama and Kawasaki cities, and Japan Steel Pipe concerning protection of environment and citizens health. According to the agreement, the major part of the refinery operation will be concentrated to two large blast furnaces (capacity of producing 6 million tons/yr of crude steel) which will be completed by 1978. For specific pollution control, the refinery will use fuels containing less than 0.5% sulfur at the present location, less than 0.65% sulfur fuel for an electric power generator boiler, and with blending of gas fuel, an average of 0.7% sulfur content fuel for the total area should be achieved. Coke furnace gas fuel should be desulfurized to less than 0.02% content; ground concentration of sulfur oxide in a 2 m velocity south wind should be less than 0.015 ppm; the maximum total emission of 770 N cu m/hr should be maintained but efforts should be made to reduce it to 650 N cu m/hr of less than 0.012 ppm sulfur oxide concentration. For sintering material, sulfur content should be less than 0.15% and more than 50% actual desulfurization should be achieved for stack gas. With regard to dust emissions, maximum standards ranging from 0.005 to 0.1 g/N cu m are designated for various emission sources, and methods of dust control are suggested.

21110 APTIC NO. 40605

(Inventor not given.)

VALVE TYPE DISTRIBUTOR FOR INTERNAL COMBUSTION ENGINES. *(Mecanisme de distribution a soupapes pour moteurs a combustion interne). Text in French. (Nissan Motor Co. Ltd. (Japan)) French Pat. 2,053,303. 19p., April 16, 1971. (Appl. July 30, 1970, 7 claims).*

A valve type distributor, developed to reduce the amounts of carbon monoxide and unburned hydrocarbons in the exhaust from automobiles at low speeds and under minor loads, is described. The inlet and exhaust valves are controlled by a valve arrangement across a cam shaft as a function of the motor vacuum and the speed. The inlet valve opens some 10 deg before the top dead center, and closes some 50 deg after the bottom dead center, while the valve is closed at an angle below 50 deg by another cam on the cam shaft. The exhaust valve is opened at 50 deg before the bottom dead center, and closed at 10 deg after the top dead center by one cam, and is opened at 50 deg after the bottom dead center by another. The delayed opening and the slightly advanced closing of the exhaust valve, as well as the delayed opening and the slightly advanced closing of the inlet valve at low speeds in city traffic result in improved combustion, without affecting the motor performance.

21111 APTIC NO. 40643

AIR CLEANING SYSTEM FOR LARGE CONSTRUCTION SITES. *(Luftreinigungsanlage fuer Grossbaustellen). Text in German. Wasser Luft Betrieb, 16(5):166, May 1972.*

For gravel pits and highway construction sites, a high-capacity air cleaning system is suitable which draws the dust-laden air into a chamber equipped with several filter bags made of synthetic fiber. The filter bags are cleaned by rapping with compressed air at certain intervals. The air cleaning system can be mounted on a wheeled frame for transportation. Smaller units can be shipped in containers.

21112 APTIC NO. 40667

PUBLIC NUISANCE CONTROL AGREEMENT OF NAGOYA CITY. *(Nagoya-shi no kogai boshi kyoteisho). Text in Japanese. Kogyo Ricchi (Ind. Location), 10(9):62-64, Sept. 1971.*

An agreement was signed between Nagoya City and various industries concerning public nuisance control measures and the protection of citizens health and environmental standards. The same agreements were signed by the total of 56 plants on four different occasions between March and July 1971. The main points covered in the agreement were: adherence to the environmental standards and emission standards designated by the national and Nagoya municipal government s; maintenance of pollution control facilities and equipment with utmost care; constant improvements of pollution control plans and programs; emergency treatment, cost responsibility; measurement and record maintenance; fuel consumption norms; inspection plans, registration and reporting plans; information and guidance; and data availability. These are some of the items that the municipal government and industries agreed upon counselling and determining according to specific individual plant situations.

21113 APTIC NO. 40668

MINI CLOTH DUST COLLECTOR. *(Mini-Gewebeentstauber). Text in German. Wasser Luft Betrieb, 16(5):166, May 1972.*

For cleaning smaller dust-laden air flows directly at the point of origin such as at mixing, sifting, polishing, crushing, weighing, and packing processes, the mini cloth filter can be used. It comes in four sizes with filter areas from 2.8 to 16.8 squ m and for air volumes from 250 to 2500 cu m/hr. All sizes have drawers for the collection of the dust retained by the cloth filters. The dust-laden air entering on top is passed through a duct. After a 180 deg change of the flow direction, the dust-laden air enters the envelope-type of cloth filters. Through the change of direction, the coarser particles are separated from the air flow. The cloth filters are periodically cleaned by a manual rapping device. A collection efficiency of 99.9% can be achieved with the mini cloth filter.

21114 APTIC NO. 40760

Bureau of Mines, Washington, D. C.

CONTROL OF SULFUR OXIDE EMISSIONS IN COPPER, LEAD AND ZINC SMELTING. *Bureau of Mines Information Circ., no. 8527:1-62, 1971. 6 refs.*

Removal of sulfur oxides from copper, lead, and zinc smelter gases will require substantial capital investment. The copper smelting industry anticipates expenditures of $600 million in order to conform to a 10% standard. The lead and zinc industry is expected to spend at least $100 million. According to industry specialists the smelting cost of copper may rise 4 cents/lb from current levels of 4 to 6 cents/lb. Lead is expected to increase 2 to 4 cents over the current cost of 2 cents/lb. Zinc may increase 1.5 cents/ lb from its current price of 6 cents/lb. Companies may find it difficult to pass the cost on to the ultimate consumer. Controversy has arisen between the metals industry and governmental control agencies over the status of stack gas desulfurization processes. New markets for sulfuric acid produced during effluent gas scrubbing must be discovered. Air pollution regulations and emission standards are mentioned. Sulfur dioxide control methods include tall stacks, conversion to H2SO4 by the contact method, absorption, lime and limestone scrubbing to yield sulfur compounds, and reduction of SO2 to elemental sulfur.

21115 APTIC NO. 40762

PROCEDURE FOR THE UTILIZATION OF WORN-OUT SCOURING LIQUIDS AND FLUE GAS DUSTS RESULTING FROM STEEL MANUFACTURING TECHNOLOGIES. *(Procede pour l utilisation de liqueurs de decapage usees et de poussieres de carneaux provenant du procede de facrication d acier). Text in French. (Leonard A. Duval) Belg. Pat. 710,780. 13p., Aug. 14, 1968. (Appl. Feb. 14, 1968, 3 claims).*

The invention is concerned with a continuous procedure for the removal of undesirable substances, e.g., zinc oxide, from iron based flue gas dusts resulting from basic steel manufacturing technologies, where the separation is made by means of spent scouring liquids such as dilute hydrochloric or sulfuric acid. After leaching in a reactor at 150-250 F and 3-5.5 pH, the iron oxide is removed from the sludge thickened by filtration, and the filtrate containing the zinc salt (chloride or sulfate) is concentrated by evaporation. The concentrate thus obtained is then roasted at about 270 F to form zinc oxide, while the gaseous HCl or SO3 released are recycled. The water from the evaporation can be recycled or discharged without treatment. The separated iron oxide containing a maximum of 0.5% zinc by volume, is recycled. This procedure is suitable for flue gas dusts containing at least 50% iron oxide and 0.25-4% zinc oxide. ½

21116 APTIC NO. 40785

Aerospace Corp., El Segundo, Calif., Office of Corporate Planning

THE EFFECT OF LEAD ADDITIVES IN GASOLINE ON EMISSION CONTROL SYSTEMS WHICH MIGHT BE USED TO MEET THE 1975-76 MOTOR VEHICLE EMISSION STANDARDS. (FINAL REPORT). *Office of Air Programs Contract F04701-71-C-0172, Rept. TOR-0172(2787)-2, 209p., Nov. 15, 1971. 142 refs.*

NTIS: PB 205981

Studies of the effects of lead additives in gasoline on emission control systems planned for 1975-76 for light duty vehicles show that lead additives and scavengers are toxic to catalytic materials, but effects on other major system components may be overcome by material selection and design techniques. All control systems now planned incorporate a catalytic converter. Lead effects are toxic enough to prevent achievement of a 50,000 mi lifetime for control systems. Sulfur and phosphorous also have toxic effects. Lead traps or exhaust scrubbers are not felt to have adequate lead removal capacity. Some systems have demonstrated approaching the 1975 standards at low mileage but compliance with the 1976 nitrogen oxide standards would require the addition of an NOx catalyst and would render them sensitive to lead. Several combination systems have met the NOx standards for 1976. Durability tests over 10-15,000 mi have not been reported. Estimated overall costs to the consumer are approximately $860 above 1970 vehicle costs on a system using a dual bed catalytic converter, a low grade rich thermal reactor, and exhaust gas recirculation. Most development has been with gasoline at lead levels of 0.02-0.23 g/gal. This level is below the proposed A.S.T.M. specification for unleaded gasoline of 0.07 g/gal.

21117 APTIC NO. 40950

MSV FUEL OIL STACK GAS DESULFURIZATION SYSTEM. *(MSV juyu haien datsuryu sochi). Text in Japanese. Kagaku Kojo (Chem. Factory), 16(5):94-96, May 1972.*

The MSV desulfurization system desulfurized oil combustion gas at the rate of 95%, utilizing active carbon adsorption and separation. The combustion gas of approximately 300 C temperature is led from a duct, and dust is eliminated by the wet method from 60 to 90%, and the temperature is lowered to 60 C if 1 l water/N cu m stack gas is used. Since a pretreatment of gas is necessary to lower 100C RH, the stack gas can be indirectly heat-exchanged and sent to the next process at temperature of 70 C and 50% RH. In the next process, sulfur dioxide is adsorbed by activated carbon, where scrubbing-separation is also achieved simultaneously. Diluted sulfuric acid and sulfurous acid are pumped up by chemical pump, and exposed to air pressure, neutralized and oxidized in a lime-packed tower. Calcium sulfide is formed and precipitated in the water in the neutralization tower. Gypsum is recovered and the remaining water is recycled as cooling water. The running cost of this system is about $1.12/kl of 1% sulfur.

21118 APTIC NO. 40394

Adam, Ernst and Wasilij Kusnezow

ENVIRONMENTAL PROTECTION AND THE MODERN POWER PLANT. *(Umweltschutz und das moderne Kernkraftwerk). Text in German. Energietechnik, 22(4):178-182, April 1972. 4 refs.*

Power plants affect the environment in three ways. First, their waste products such as carbon, compounds of sulfur and nitrogen, dust, and radioactivity pollute the immediate human environment. Apart from physical damages to living organisms, buildings are ruined by corrosion and the natural processes are increasingly disturbed. The steadily increasing carbon dioxide level may not only interfere with the carbon cycle but also with the heat balance of the earth. Secondly, the waste heat from power plants affects the environment. There is a tendency toward increased re-use of this waste heat for domestic heating, greenhouse heating, and frost protection. Third, the need for more power plants consumes space which is already scarce in the German Democratic Republic. One solution to these problems would be the installation of nuclear power plants on the bottom of the ocean to supply power to the continents by superconductive cables. All emissions from these plants could be reduced to the emission of waste heat by technically and economically feasible means.

21119 APTIC NO. 40628

Akbrut, A. I. and L. I. Kropp

DETERMINATION OF THE AVERAGE DROPLET SIZE FOR THE DESIGN OF ASH CATCHING EQUIPMENT PROVIDED WITH VENTURI TUBES. *(Opredeleniye srednego razmera kapel dlya rascheta zoloulovitelya s truboy Venturi). Text in Russian. Teploenergetika, no. 4:81-83, 1972. 6 refs.*

Experiments on the determination of the average droplet size of water, atomized by gas flow, are described. The droplet size distribution as a function of the water pressure was determined. Practically completed atomization within the throat zone of the diffusor was observed. Droplet velocities along different sections of the tube were determined, and the average droplet diameter was obtained from the maximum difference of the droplet and gas velocities. The maximum differences in the velocity, increasing with increased gas flow rates in the throat, slightly decreased with rising throughput capacities. Average droplet diameters as a function of the gas flow rate in the throat of the venturi tube are presented. In order to consider losses due to evaporation in the venturi tube, the results obtained for the average droplet size in the test equipment were increased in 10%.

21120 APTIC NO. 40005

Anderson, John L. and Patrick M. Finnegan

CREATING NEW CITIES THROUGH THE LARGE AIR-CUSHION VEHICLE. *Astronaut. Aeronaut., 10(1):46-54, Jan. 1972. 21 refs.*

Social and economic effects of air-cushion vehicles (ACV) could stimulate economic growth. New geographical freedom would result from the surface-independence of the ACV and would allow new choices of location for harbors, cities, and transportation routes. The largest ACV in the world, the British SRN-4, weighs 150 metric tons, carries 250 passengers and 30 cars at a cruising speed of 65 knots. Service reliability of the SRN-4 is 95%. External engine noise has been described as less than that of a taxiing four-engine propeller driven craft. Utilization of nuclear power plants in the 4000 to 6000 metric ton ACVs seems feasible and competitive on transoceanic routes and 1000 to 2000 metric ton chemical ACVs could be competitive in coastal shipping. Service to satellite cities, independent cities, and floating cities is envisioned. Hoverports for ACVs are not limited to coastal areas since the ACV moves readily over land. Interfaces between domestic and international carries in heretofore unexploited areas would provide employment opportunities outside crowded urban areas. A hoverport city could be profitable in less time than an industrial airport city and could easily be integrated into an international-domestic interface as a hoverport-jetport city. The resulting profitability could substantially reduce the cost of air-freight. The small ACV has already proven to be technically and economically practical for immediate transportation over any relatively flat surface.

21121 APTIC NO. 40212

Ando, Jumpei

RECENT DEVELOPMENTS IN DESULFURIZATION OF FUEL OIL AND WASTE GAS IN JAPAN (1972). *Chuo Univ., Tokyo (Japan), Faculty of Science and Engineering. APTD-1066, 87p., 1972. 19 refs.*

NTIS: PB 208236

Japan today may well be the most advanced country in the world in the practice of desulfurization. Nineteen commercial plants for hydrodesulfurization of heavy oil and many commercial plants for stack-gas desulfurization are already in operation in Japan, where various new processes including gasification of fuel oil are being developed. An important feature of the desulfurization efforts is that almost all are oriented toward processes that yield salable by-products such as sulfur, sulfuric acid, sodium sulfite, and high-quality gypsum. Most of the oil used in Japan comes from the Middle East, where the crude oil is especially rich in sulfur, as much as 4% in Khafji crude after topping. Many hydrodesulfurization plants have been built since 1967. Three of them use the topped-crude desulfurization process (or the atmospheric residual desulfurization process which is often referred to as the direct process) and others the vacuum gas-oil desulfurization process (indirect process). By the direct process, up to 75% of sulfur in oil can be removed, but the life of catalyst is a problem. By the indirect process, as much as 2.4% sulfur remains after treatment of heavy oil with a 4.0% sulfur content. The methods and economics of various processes of desulfurization of heavy oil and waste gas employed in industries and explored in government research projects are described. Wet waste-gas desulfurization processes include sodium scrubbing, ammonia scrubbing, Wellman-Lord process (absorption with sodium sulfite), lime scrubbing, catalytic oxidation of sulfur dioxide to sulfuric acid, absorption of SO2 by magnesium hydroxide, magnesium-magnesium oxide scrubbing, absorbing with calcium hydroxide, and hydrogen sulfide recovery. Dry processes include manganese oxide absorption, activated carbon adsorption, sodium carbonate injection, and cupric oxide absorption. Costs are cited.

21122 APTIC NO. 40101

Arnold, Ronald, John, Kendal, and Keith Gilbert Doyle

HEAT EXCHANGER AND AUTOMOBILE EQUIPPED WITH SUCH HEAT EXCHANGER. *(Recuperateur de vapeur et vehicule a moteur comportant un tel dispositif). Text in French. (British Petroleum Co., Ltd. (England)) French Pat. 2,054,406. 6p., April 5, 1971. (Appl. July 9, 1970, 8 claims).*

The invention is concerned with a heat exchanger, based on the Peltier effect, for the prevention of gasoline vapor emissions from automobiles. One or more battery-fed Peltier elements are inserted in the wall of a vapor duct which is connected to an appropriate orifice in the automobile. One part of the above pipe wall is formed by the cold surfaces of the Peltier elements, and thus direct contact with the gasoline vapors is provided. The vapors are cooled and condensed by the passage of the current before they could escape. The hot surfaces of the Peltier elements are in thermal contact with a heat absorber (metal tank containing water) which absorbes the heat during short periods of exceptionally high ambient temperatures. Both the hot surfaces of the Peltier elements and the heat absorber can be provided with fins for intensified heat dissipation. The heat dissipation from the Peltier elements can be further improved by the use of a radiator which is cooled by the turbulent air movement produced by the automobile.

21123 APTIC NO. 40088

2Aronov, D. S. and L. S. Sukhareva

FIELD TESTS OF GASOLINE WITH A MANGANESE ANTIKNOCK ADDITIVE IN ZIL-130 MOTOR VEHICLES. *(Ekspluatatsionnyye Ispytaniya Benzina s Margantsevym Antidetonatorom na Avtomobilyakh ZIL-130). Avto. Topl., Smaz. Mater. Spetszhid., no. 5:37-44, 1968. 2 refs. Translated from Russian. Leo Kanner Assoc., Redwood City, Calif., 12p., Dec. 1971.*

Four ZIL-130 trucks were operated for the test period on gasoline with a manganese antiknock additive and compared with three of the same trucks which were operated on regular fuel. After 450,000 km of total testing, the gasoline with manganese additive increased deposits on spark plugs. Further testing of fuels and changes in spark plug design were recommended.

21124 APTIC NO. 40416

Atkins, R. S., J. D. McKenna

SCRUBBING OF SO2 AND PARTICULATES DEMONSTRATED ON INDUSTRIAL BOILER. *Power Eng., 76(5):50-51, May 1972.*

A combined sulfur dioxide-particulate removal system has been in use in a Stockholm hospital heating system since 1969. Numerous performance tests at full boiler load showed removal of 98% or more of the SO2 in the flue gas. At full load, the boiler burns 225 gph of No. 4 oil at 1.5% sulfur content. Calcium carbonate, sodium hydroxide, or calcium hydroxide may be used as a reagent. Annualized operating costs are about 20 cents/million BTU.

21125 APTIC NO. 40023

Bapseres, P.

THE FIGHT AGAINST POLLUTION IN THE REFINING AND PETRO-CHEMICALS INDUSTRY. *(La lutte contre la pollution dans l industrie du raffinage et la petrochimie). Text in French. Entropie, no. 41: 113-121, Sept.-Oct. 1971.*

The general problems of pollution control in the French petrochemical industry as well as related research are reviewed. Comprehensive research on gaseous pollutants is pursued by CITEPA (Centre Interprofessionnel Technique d Etudes de la Pollution Atmospherique), in cooperation with the petrochemical industry and competent institutions. The demand in France for petroleum is expected to rise from 115 million tons in 1970 to 250 million tons in 1980 (expressed in coal equivalent). Combustion gases and odorous substances are the principal pollutants in refineries, while dust emissions are negligible. The combustion gases from fuels fired for heat generation usually contain 50-200 ppm of carbon monoxide, 50-800 ppm of sulfur dioxide and 100-300 ppm of nitrogen oxides. Organic sulfur compounds, and both unsaturated and aromatic hydrocarbons are the major odorous pollutants in refineries. Special burner designs, operating with vapor jet, make complete combustion possible. Proper choice of site, processing low-sulfur petroleum, emission monitoring, improvements in technology, and the desulfurization of the crude oil or the waste gases are the basic measures in abating pollution. A waste gas cleaning method, yielding 94% sulfuric acid, and another technique, reducing sulfur dioxide to elemental sulfur, are briefly described.

21126 APTIC NO. 40749

Bastress, E. K., K. M. Chng, D. M. Dix, and R. J. Murad

CONTROL OF NITROGEN OXIDE EMISSIONS FROM DIESEL ENGINES: A THEORETICAL ANALYSIS. *Northern Research and Engineering Corp., Cambridge, Mass., Office of Air Programs Contract EHS 70-116, Rept. 1160-1, 104p., June 8, 1971. 18 refs.*

NTIS: PB 206005

Theoretical analysis has been used to develop nitrogen oxide control criteria by correlation of engine design, performance, and emission characteristics. Two mathematical models, one for direct-injection (DI) engines and one for indirect-injection (IDI) engines, were used to predict horsepower, fuel consumption, and NOx emission rate at standard operating conditions. The models produced realistic values which agree with measured values. For DI engines a 50% reduction in NOx emission rate can be achieved with small losses in engine performance by increasing the injection rate and retarding injection timing. It was also indicated that IDI engines are naturally lower than DI engines in NOx emissions. This advantage can be accentuated by restricting the injection of fuel to the precombustion chamber until burning occurs. This may increase fuel consumption, but the NOx emission reduction effectiveness appears to be high. (Author conclusions modified)

21127 APTIC NO. 40463

Batel, Wilhelm

A CONTRIBUTION TO THE SYSTEMATOLOGY OF DUST COLLECTION. *(Ein Beitrag zur Systematik der Entstaubungstechnik). Text in German. Staub, Reinhaltung Luft, 32(5):195-197, May 1972. 8 refs.*

Dust collection is the removal of particles with sizes between 0.001 to 1000 micron from gases where they are dispersed in solid or liquid form. Separation can be made by scrubbing, electrostatic precipitation, filtration, gravity settling, inertial separation, or centrifugal force. Through a division of the dust collection process into three phases (superimposition of a force which is stronger than the force that keeps the particles suspended in the gas, separation of the particles, and cleaning of the separation zone) the influences on the quality of the dust collection process can be assessed. The collection efficiency for the total dust or for a certain particle size is obtained from the dust fraction which during its presence in the displacement zone is transported to the separation zone, minus the quantity of dust which returns to the former dispersion state in the gas. The displacement speed is influenced by the efficiency of the superimposed forces and by the flow resistance.

21128 APTIC NO. 40070

Bauer, Uwe, Klaus Hoppe, and Gerhard Krueger

COLUMN TRAYS WITH TRANSPORT EFFECT. *(Austauschboeden mit Transporteffekt). Text in German. Chem. Tech. (Berlin), 23(11):652-656, Nov. 1971. 32 refs. (Presented at the Meeting of the FUA Son Termische Stofftrennung, 8th, Halle, Nov. 6, 1970.)*

Special column tray designs, required for certain special separation techniques, for example nitrogen oxides absorption, were analyzed. Trays in which the gas exercises transport effect on the liquid were considered1, and tw4o groups of trays wit positive and negative transport effect were distinguished. The transport effect could be improved by proper arrangement of the gas outlets in baffle trays with positive transport effect, and it was possible to control the flow speed of the liquid in trays with negative transport effect. The pressure losses were higher for negative than for positive transport effect, while the differences between total and dry pressure loss were very large. The design principles determined for nitrogen oxides absorption are aperture ratios below 0.05, multiple deflection (1.25-1.5 baffles/m of diameter), minimum weir height of 1 m, and cooling coil systems. A combined tray type with interrupted negative transport effect was designed.

21129 APTIC NO. 40098

Beaver, C. E.

COTTRELL ELECTRICAL PRECIPITATION EQUIPMENT. SOME TECHNICAL AND ENGINEERING FEATURES, RECENT DEVELOPMENTS AND APPLICATION IN THE CHEMICAL FIELD. *Trans. Am. Inst. Chem. Engrs., vol. 42:251-261, 1946. (Presented at the American Institute of Chemical Engineers, Chicago, Ill., Dec. 16-19, 1945.)*

The basic technical and engineering features of a Cottrell electrical precipitation installation are described including the equipment required, various types of precipitators for specific applications, and design factors. The variables influencing the rate of precipitation or efficiency of removal are reviewed, particularly gas velocity, time of treatment, current flow, and surface conductivity of the suspended particles. Recent improvements in design, construction, and operation are outlined. Cottrell equipment is used extensively in the chemical and metallurgical industries, often to recover a marketable byproduct, to clean a gas stream for subsequent uses, or to control an air pollution problem. Recent applications in the phosphorous, pulp and paper, carbon black, and petroleum industries are discussed. (Author abstract modified)

21130 APTIC NO. 40789

Bennett, Raymond R.

AIR QUALITY, SOUND CONTROL, AND ESTHETICS. *Ebasco News, 24(3):10- 12, March-April 1971.*

The constituents of fossil plant stack gases which are receiving primary attention from legislative bodies include particulates, sulfur oxides, and nitrogen oxides. Particulate matter can be removed from flue gases by mechanical collector, electrostatic precipitator, or wet scrubber. The systems proposed to date for the removal of sulfur include chemical scrubbing systems which saturate the flue gas and dry systems which do not add moisture to the flue gases. Dry systems include an electrostatic precipitator for removal of particulate matter, and utilize various chemical processes to remove and reclaim sulfur products for sale as a by product. Control measures for nitrous oxides from gas and oil fired boilers have emphasized a modification of the combustion process to reduce temperature at the burners. Sound control, esthetic considerations, investment factors, energy costs, and sale of by-products are also indicated.

21131 APTIC NO. 39963

Billings, Charles E., W. David Small, and Leslie Silverman

METHODS FOR CONTROLLING AIR POLLUTION FROM STEEL PRODUCTION OPERATIONS. OPEN HEARTH STACK GAS CLEANING STUDIES. SEMI-ANNUAL REPORT. *Harvard School of Public Health, Boston, Mass., Rept. SA-3, 63p., Oct. 14, 1955. 2 refs.*

Some methods for the control of air pollution from steel producing operations are investigated. The air flow characteristics of a rotary screw-agglomerator and the relationship between rotational direction and speed of the screw were established. The curved path followed by air in moving through a steel conveyor screw produced 1.3-4.5 times as much resistance as the equivalent straight distance. A method for the generation of iron oxide fume from the combustion of iron pentacarbonyl was also studied. The filtration characteristics and resistance to acid attacks of two commercial slag wool fibers were determined. A continuous slag wool filter for open hearth furnace fumes was developed and tested in laboratory and field experiments on iron oxide fume. The average efficiency of a continuous web of slag wool removing sulfur dioxide and sulfuric acid was 50-60% with a range of 10-90%. Filter resistance was maintained near four inches of water during continuous operation of 1/2 to 3 hr. A correlation between inlet fume loading and furnace production influenced filter requirements. (Author summary modified)

21132 APTIC NO. 40377

Blanken, Guenther, Dieter Strauch, and Cord Tietjen

WASTES FROM AGRICULTURAL ANIMALS. *(Abfaelle aus Massentierhaltungen). Text in German. Muell Abfall, 4(2):37-47, April 1972.*

Kinds and quantities of farm animal manure, treatment and removal methods, and storage and transportation aspects are reviewed in detail. In the Federal Republic of Germany the annual quantity of animal excrements amount to 190 million tons. The treatment of this material depends on its consistency. Farms with fowl and pigs emit especially bad odors for which several methods of prevention are proposed. The dung channels have to be equipped with ground lockings so that air movements is reduced. Ventilation of the stables should be effected by means of roof-top shafts. Bad odors can be absorbed by peat or straw or by addition of chemicals like chloride, superphosphate, or chalk to the excrements. Another method is the scrubbing of the odorous air. The air is led to a lock into which water and disinfectants are sprayed by fine nozzles. Combustion of the contaminated air at temperatures exceeding 800 C also destroys bad odors.

21133 APTIC NO. 40553

Bloomfield, B. D.

EXPERIENCE WITH CUPOLA CONTROL FOR JOBBING AND LOW PRODUCTION RATE GREY IRON FOUNDRIES. *Preprint, American Foundrymen s Society, Des Plaines, Ill., 4p., 1970. (Presented at the Total Environmental Control Conference, Ann Arbor, Mich., Nov. 16-19, 1970, Paper IV-1.)*

A considerable amount of working experience is being developed with all types of cupola collectors including systems that perform well on a sustained use basis. The dry centrifugal system and the wet cap collection system described are marginal performers. Their use should be on a special basis where the character of the neighborhood can accommodate the level of performance. The cupola melt rate appears to be a particularly limiting factor. When a decision to install a dry centrifugal or wet cap system is made, it should be with the understanding that there is no flexibility in the control approach. Unless additional equipment is added at a later date, performance cannot be improved to accommodate an increased melt rate, as would be the case with a high energy variable orifice type wet collector. An increase in melt rate would probably result in emissions which exceed a loading of 0.4 lbs/1000 lbs of gas. Particulate emission limits in Michigan, cost factors, and stack sampling are also mentioned.

21134 APTIC NO. 40537

Bollmann, F.

OIL EXTRACTION PLANT WITH REVOLVING EXTRACTOR BY THE VEB SKET MAGDEBURG. *(Oelextraktionsanlagen mit Karussellextrakteur vom VEB SKET Magdeburg). Text in German. Lebensmittel Ind., 19(4):141-143, April 1972.*

An extractor for vegetable oils is described which has been built according to the latest scientific-technical knowledge. The entire extraction plant comprises four individual units, the extractor, a defuelling section, a miscella distillator, and the solvent recovery section. The gasoline vapors which develop in the evaporator and which carry grit particles are wet-cleaned in a cyclone. The hot water which is injected into the rising solvent vapors has a temperature of 95 C. The vapors cleaned in the cyclone are used for heating the first evaporator stage.

The not entirely condensated solvent vapors from the heating room of the Kestner-evaporator are condensed in a condenser. All solvent vapors not condensed in the various condensers and the solvent vapors from the waste air lines are passed into the preliminary cooler for gas-air mixtures. The non condensed fractions from this cooler are passed to the absorber, later desorbed, and recovered.

21135 APTIC NO. 39961

Breuer, Hans and Lothar-Hans Engels

WET SCRUBBERS: DEVELOPMENT AND TEST STAND RESULTS. *Staub (English translation from German of: Staub, Reinhaltung Luft), 29(3):8-13, March 1969.*

When extracting, conveying, and processing coal and rocks in the coal mining industry, considerable qualities of dust occur for which there are various methods of control. The requirement with regard to the methods and designs to be used in dust removal technology for coal mining are to a large extent unknown in other branches of industry. Dust separators based on wet methods were the main object of the investigations carried out in recent years. The capacity ranges for low-pressure, medium- pressure, and high-pressure wet dust separators and the functional relationships obtained for separation under specific conditions are shown. The selection of dust separators is discussed. Characteristic relationships for the efficiency of wet dust separators are summarized. (Author summary modified)

21136 APTIC NO. 40391

Brink, Josef A.

FIBER PACK AGAINST INDUSTRIAL MISTS. *(Faserpackung gegen Industrienebel). Text in German. Tech. Umweltmag., no. 2:42-43, April 1972.*

A mist separator consisting of special fiber packs sandwiched between two steel grids is described. The particles collected on the fiber surface form a liquid film which moves horizontally through the filter bed. Due to the force of gravity they drop into a collection vessel on the bottom of the filter. The cleaned gases are drawn off at the filter head. Mist separators operate either on the impaction principle, or they make use of the force of inertia or Brownian motion by large or medium sized particles. The efficiency depends on particle size, it is almost 100% for particles larger than 3 micron in diameter and is 99.98% for particles smaller than 3 micron. In the Cat-Ox method the hot waste gases are drawn off from the boiler at a temperature of 474 C and passed through an electrostatic precipitator where more than 99.5% of the fly ash is removed. Sulfur dioxide is then oxidized to sulfur trioxide and gradually cooled to about 232 C. The gas is passed through an absorption tower where the temperature is further decreased to 107 C, and the acid condenses. A mist separator separates the acid mist from the gas which is blown out of the stack. Experience with a prototype plant has shown that all the fly ash, 90% of the SO2, and all the sulfuric acid are removed from the waste gas. The mist separators can also be used for the removal of organic vapors. The gas is first cooled to a temperature below the dew point of the vapors. Part of the vapors condense on the heat exchanger and part of the waste gas condense to fine mists which are then separated.

21137 APTIC NO. 40612

Budkina, O. G., B. F. Kuznetsov, T. A. Semenova, and M. I. Markina

DIFFUSION-INHIBITED CONVERSION OF CARBON MONOXIDE OVER A LOW TEMPERATURE CATALYST. *(Vliyaniye diffuzionnogo tormozheniya na protsess konversii okisi ugleroda na nizkotemperaturnom katalizatore). Text in Russian. Kinetika i Kataliz, 12(2):528- 531, 1971. 4 refs.*

Catalysis tests were performed to determine optimum size, tableting pressure, and temperature for low-temperature catalysts. The active mass contained zinc oxide, chromium trioxide, and copper oxide as well as aluminum oxide, manganese oxide, and magnesium oxide as stabilizers. The carbon monoxide conversion under atmospheric pressure occurred in the kinetic range over samples with a maximum size of 1.5 mm, and pressed under 2500 kg/sq cm, while the process lay in the transitory or diffusion range for tablets over 1.5 mm. Changes in the tableting pressures were found to significantly affect the inhibition due to diffusion. The external diffusion had no effect on the process. The optimum tableting pressure was 2500 kg/sq cm, and a maximum temperature interval for the transitory range of 175-250 C was found for the above pressure and tablets of 4 by 5 mm.

21138 APTIC NO. 40380

Buerkholz, Armin and Edgar Muschelknautz

DROPLET SEPARATOR. A SRUVEY OF THE STATE OF THE ART. *(Tropfenabscheider. Uebersicht zum Stande des Wissens). Text in German. Chem. Ing. Tech., 44(8):503-509, April 1972. 8 refs. (Presented at the Verfahrens-Ingenieure, Annual Meeting, Nuremberg, West Germany, Sept. 21-23, 1971.)*

The collection efficiencies of the cyclone, lamellar (thin plate) separator, wire mesh packs, and electrostatic precipitator for various grain sizes at various entrance speeds are discussed and compared with calculated values. The collection efficiencies for various grain size fractions of two small cyclones (6-liter volume and 150-millimeter diameter, and 0.3-liter volume and 70-millimeter diameter) are plotted, showing that increasingly fine particles are separated with increasing pressure loss. If water is injected in addition, the collection efficiency is further increased. For small gas throughputs cyclones are suitable separators. A lamellar separator with a distance of the lamellae of just several hundred micron and high pressure loss separates particles smaller than 1 micron with an accuracy of 80%. The distance between the lamellae is soon closed by dust deposition. For particles larger than 5 to 10 micron the separator is highly efficient. Wire mesh packs are highly efficient for retention of particles sized between 1 and 10 micron. Particles smaller than one micron can be separated if the wires are wrapped into fine (20 to 50-micron thick) synthetic fibers. For the removal of droplets with diameters smaller than 2 micron, electrostatic precipitators are in wide use. Here the collection efficiency depends heavily on the gas velocity.

21139 APTIC NO. 40715

Buzanova, G. N., I. G. Lesokhin, I. P. Mukhlenov, and L. I. Vinnikov

OXIDATION OF SULFUR DIOXIDE OVER ACTIVATED CARBON AT ELEVATED TEMPERATURES. *(Okisleniye sernistogo angidrida na aktivirovannom ugle pri povyshennykh temperaturakh). Text in Russian. Khim. Prom. (Moscow), no. 3:205-207, 1972. 10 refs.*

The chemical adsorption of sulfur dioxide over activated carbon in the presence of water vapor was studied under dynamic conditions. The adsorption capacity of activated carbon as a function of temperature and water vapor content (0-9.5% by volume) was studied in test equipment. The gas, containing 1% of SO2 by volume, was admitted at a rate of 1.4 l/min. The ratio of the physically to the chemically adsorbed SO2 from dry gas at 26 and 150 C was practically the same (77:23), while the amount of the chemically adsorbed SO2 at 26 C and a vapor concentration of 3% was 99%. The proportion of the chemically adsorbed SO2 decreased with increasing temperature, while it was consequently higher in the presence of vapor than in dry gas. The increase in the adsorption capacity due to increased vapor content is able to partly compensate for the decrease in the adsorption due to elevated temperatures. Concentrated SO2 or sulfuric acid can be obtained from the thermal desorption of the activated carbon.

21140 APTIC NO. 39893

Calaceto, Ralph R.

SLUDGE INCINERATOR FLY ASH CONTROLLED BY CYCLONIC SCRUBBER. *Public Works, 94(2):113-114, Feb. 1963.*

Fly ash from a Detroit municipal sludge incinerator is entrained in water droplets in a cyclonic jet scrubber with a precooler. The cyclonic principle used enables the incinerator exhaust gas to spin by means of a tangential gas inlet. As the gas spirals up through the scrubber, the fly ash particles collide with the injected water droplets from wall-mounted sprays. The dirty droplets are spun over to the wall and washed down to the drain; the clean gas is exhausted by a vane axial-type fan. Fly ash collection efficiency is 95.9%. The scrubber reduces the average grain loadings of 3.5 grains/cu ft to 0.145 grain.

21141 APTIC NO. 40953

Calaceto, Ralph R., Reuben H. Durst, and David Miller

SCRUBBERS WITH ADJUSTABLE VENTURIS. *Slick Industrial Co., Summit, N. J.) U. S. Pat. 3,638,924. 5p., Feb. 1, 1972. 10 refs. (Appl. Aug. 22, 1968, 1 claim).*

A gas scrubber is described which has an adjustable venturi throat to receive the gas to be cleaned as well as the liquid for cleaning the gas. The adjustable venturi throat has a pair of inner straight parallel edges which extend perpendicular to the central axis of the venturi and which are situated in a plane normal to the central axis. These inner edges are equally and oppositely displaced by the adjustable venturi to define its smallest throat area. This adjustable venturi throat structure includes a pair of tiltable baffle plates having inner edges which define the inner edges of the venturi throat. The liquid is supplied in sheets between which the gas flows centrally through the venturi, so that the liquid is directed transversely across the gas at the venturi throat with the accelerated gas bursting through the liquid to shatter it into minute droplets. (Author abstract modified)

21142 APTIC NO. 40725

Cetinbas, Abdurrahman, R. P. Vinson, Joseph Cervik, and M. G. Zabetakis

METHANE AND DUST CONTROL BY WATER INFUSION. PITTSBURGH COALBED (FAIRVIEW, W. VA.). *Bureau of Mines, Pittsburgh, Pa., Pittsburgh Mining and Safety Research Center and Bureau of Mines, Pittsburgh, Pa., Methane Control and Ventilation. Rept. Investigations 7640, 20p., 1972. 11 refs.*

The effect of water infusion on the flow of methane and on the production of dust was investigated at an active face in the Pittsburgh coalbed near Fairview, West Virginia. The average total flow of methane at the face decreased by approximately 79%, whereas the flow from the ribs increased about 24% after infusion. Infusion holes 55-127 ft and 100-300 ft apart were effective in this respect for at least 5 days. On the day after infusion, dust concentrations appear to have been reduced; however, the presence of large quantities of rock dust obscured the results on the following days. The procedures described here can be incorporated into the mining cycle if the drill crews operate during idle shifts or over a weekend, making it possible to increase the level of safety materially with no loss in face productivity. Additional work is required to determine the effect of water infusion on the rate at which coal is mined and dust is produced, and to establish optimum hole depths and water infusion levels. (Author abstract modified)

21143 APTIC NO. 39866

Chapoux, Edouard

REVIEW PAPER ON AIR POLLUTION. *(Etat de la question pollution de l air). Text in French. Society of Automotive Engineers, Inc., New York and Federation Internationale des Societes d Ingenieures des Techniques de l Automobile, Brussels (Belgium), Intern. Auto. Safety Conf., Proc., Brussels, Belgium, 1970, 21p. (Paper 15.3.A.)*

The automobile as a primary cause of air pollution is reviewed. The most recent criteria published by the State of California concerning the limitation of air pollutants in order to maintain an acceptable environment are examined, together with the limits which will be imposed upon vehicles in the United States in the future. American and European regulations are compared. Different control possibilities available to the manufacturer are indicated, and various methods to make the automobile cleaner are cited.

21144 APTIC NO. 40665

Cheng, L., S. K. Tung, and S. L. Soo

ELECTRICAL MEASUREMENT OF FLOW RATE OF PULVERIZED COAL SUSPENSION. *Trans. ASME (Am. Soc. Mech. Engrs.), 92(A-2):135-145, April 1970. 17 refs. (Presented at the American Society of Mechanical Engineers, Winter Annual Meeting, Los Angeles, Calif., Nov. 16-20, 1969, Paper 69-WA/Pwr-1.)*

Electrostatic probes for indicating the instantaneous flow rate of a pulverized coal suspension in a pipe were devised and tested. Experiments were performed on flow systems consisting of two and five inch-ID pipes with mass flow ratios of up to 0.66 lbs of coal/lb of air at up to 115 ft/sec air velocity. Calibrations were made with a differential isokinetic sampling technique. With accurate control of probe potential, consistent indication of electrostatic ball probes was at the 1 times 10 to the 8th power amp level, and at the 1 times 10 to 9th power amp level with cylindrical probes. Accuracy within 1% was feasible. Since the probe output is an electrical signal, this device makes an integrated control system, including the coal line, feasible. Instantaneous and accurate fuel adjustment into furnaces facilitates air pollution control. (Author abstract modified)

21145 APTIC NO. 40383

Cir, Jaroslav and Rudolf Kubicka

HYDRODESULPHURIZATION OF PRIMARY AND SELECTIVELY PREPURIFIED CRUDE OIL DISTILLATION RESIDUES. II. DIRECT HYDRODESULPHURIZATION - CATALYSTS USED- CONCLUDING REMARKS. *(Hydroentschwefelung von primaeren und selektiv vorgereinigten Rohoel-Destillationsrueckstaenden. II. Direkte Hydroentschwefelung - Verwendete Katalysatoeren - Schlusswort). Text in German. Erdoel Kohle (Hamburg), 25(4):181-183, April 1972. 1 ref.*

Mazut can be directly desulfurized with special catalysts such as Ni-Mo-Al203 and Co-Mo-Al203. The desulfurization capacity of the two catalysts is similar with the exception that the Ni-Mo-Al203 catalyst removes nitrogen compounds better. The degree of desulfurization is greatly influenced by the temperature. An increase of the hydration temperature from 360 to 400 C raises the average degree of desulfurization from 62 to 87%. At a desulfurization to 1% sulfur the lifetime of the catalyst is at least 6 mo. The distillates obtained with the direct hydrodesulfurization have similar properties to those obtained by hydrodesulfurization of the deasphaltized products. Direct hydrodesulfurization requires a simpler technology and lower investment cost compared with the separate desulfurization of the vacuum fraction and the deasphaltized residue.

21146 APTIC NO. 40702

Cir, Jaroslav and Rudolf Kubicka

HYDRODESULFURIZATION OF PRIMARY AND SELECTIVELY PREPURIFIED CRUDE OIL DISTILLATION RESIDUES. I. INTRODUCTION - QUALITY OF THE RESIDUES - HYDRODESULFURIZATION AFTER DECOMPOSITION BY DISTILLATION.

(Hydroentschwefelung von primaeren und selektiv vorgergeinigten RohoeltDestillationsrueckstaenden. I. Einleitung - Beschaffenheit der Rueckstaende - Hydroentschwefelung nach destillativer Auftrennung). Text in German. Erdoel Kohle (Hamburg), 25(3):123-130, March 1972. 22 refs.

Using Romaschkino oil as an example, a fuel oil desulfurization process is discussed which comprises the decomposition by distillation of mazut into vacuum oil and vacuum residue by selective deasphaltization and desulfurization. A low-sulfur fuel oil can then be recovered by mixing the two desulfurized products. The degree of desulfurization which can be achieved depends on the asphaltene concentration and rises with increasing reaction pressure. An initial reaction temperature of 350 C is required even if the catalyst is fresh, since the sulfur compounds in the deasphaltized product have a higher resistance to hydrolysis. With increasing deactivation of the catalyst the temperature can be raised from 350 to 430 C. The desulfurization is better if a catalyst with a large geometric surface is used. The desulfurization of the deasphaltized products was tested on a small scale model. The results led to the erection of a plant for the annual desulfurization of 1 million tons of mazut. The hydrodesulfurization of the vacuum oil to a residual sulfur concentration of 0.2 to 0.4% is carried out at pressures of 50 to 100 bar. The lifetime of the catalyst is at least 24 mo. A maximum of 0.20 kg catalytic mass/1 ton low-sulfur fuel oil is required. The production of low-sulfur fuel is accompanied by the production of elemental sulfur. Direct hydrodesulfurization of mazut will be discussed in Part II.

21147 APTIC NO. 40013

Clouse, R. L.

PRELIMINARY DESIGN OF A MECHANICAL-DRAFT COUNTERFLOW COOLING TOWER. *ARO, Inc., Arnold Air Force Station, Tenn., Air Force Systems Command Contract F40600-72-C-0003, ARO Proj. BE2151-A11 ARO-ETF-TR-71-162, AEDC-TR-71,213, Program Element 64719F, 41p., Oct. 1971. 14 refs.*

NTIS: AD 731193

The need for a method whereby the preliminary design of a cooling tower can more easily be specified has existed for many years. The numerical techniques commonly used to solve the Merkel cooling tower equation are not adaptable to a direct general solution. A direct solution to the Merkel equation is presented which, when combined with certain detailed experimental data by others, yields a relatively quick and straightforward method of establishing the preliminary design of a mechanical-draft counterflow cooling tower. Special attention is devoted to cooling tower applications relative to high altitude engine test facilities. Tower characteristics are discussed versus water temperature ranges. (Author abstract modified)

21148 APTIC NO. 40235

Collins, A. C.

ATMOSPHERIC POLLUTION BY SULPHUR DIOXIDE. *Rep. Prog. Appl. Chem., vol. 55:643-663, 1970. 114 refs.*

Various aspects of atmospheric pollution by sulfur dioxide are reviewed. During the past 10 years, SO2 has been singled out as particularly harmful and has been linked to occurrences of smog-causing deaths. Catalytic and photolytic oxidation and other reactions of SO2 in the atmosphere are considered. The effects of SO2 on health range from slight irritation and increased pulmonary resistance to emphysema and increased mortality rates due to chronic lung diseases. The effects on vegetation, materials, and economics are also discussed. The major sources of SO2 emissions are industries, e.g., power plants, ore smelting, and petroleum refining, and domestic use of high-sulfur fuels for heating. Control methods to prevent emissions of SO2 into the atmosphere include desulfurization of fuels, e.g., selective pulverization, froth floatation, magnetic separation, bacterial action, hydrogenation, solvent refining, and hydrodesulfurization, and SO2 removal from the processes through alkaline additive techniques, wet scrubbing, absorption, catalytic oxidation, the Reinluft process, alkalized alumina, manganese dioxide systems, Claus processes, and process modifications. Data on economic costs of SO2 damage, SO2 emissions, sulfur contents of coals and oils, and cost estimates for controls are tabulated.

21149 APTIC NO. 39946

Colucci, J. M. and G. J. Barnes

THE EFFECT OF EXHAUST SYSTEM GEOMETRY ON EXHAUST DILUTION AND ODOR INTENSITY. *Preprint, Society of Automotive Engineers, Inc., New York, 11p., 1971. 2 refs. (Presented at the Automotive Engineering Congress, Detroit, Mich., Jan. 11-15, 1971, Paper 710219.)*

Diesel exhaust gas dilution and odor intensity were measured in the immediate vicinity of a transit bus equipped with a rear-mounted horizontal exhaust pipe, a rear-mounted vertical exhaust pipe, and a roof-top diffusion system to determine the effect of exhaust system geometry. Exhaust dilution ratios were measured indoors during vehicle idle operation, using propane added to the exhaust gas as tracer. Exhaust odor intensities were measured indoors during idling by a human panel, using a threshold odor-measurement technique. Dilution of exhaust gas around the bus averaged about eight times greater with the vertical exhaust pipe than with the horizontal pipe. Odor intensity, as measured by the threshold response distance, was about 35% less with the vertical pipe than with the horizontal pipe. The roof-top diffuser was not as effective as the vertical exhaust pipe in increasing exhaust gas dilution or in reducing exhaust odor intensity. (Author abstract modified)

21150 APTIC NO. 40002

Cornelius, George W.

AFTERBURNER APPARATUS HAVING LINED BURNER CAN. *(Assignee not given.) U. S. Pat. 3,641,768. 4p., Feb. 15, 1972. 8 refs. (Appl. Feb. 20, 1970, 8 claims).*

This afterburner may be substituted for the muffler in a conventional automobile exhaust system. The flame chamber is constructed of relatively low thermal capacity material, thus producing a minor amount of quenching and allowing relatively complete combustion of combustibles. High temperature may be achieved in a relatively short period of time. The flame is projected forward to cause early combustion. A pilot burner is mounted in the chamber and a means is provided to control the rate and ratio of fuel and air in response to various engine speeds and conditions. (Author summary modified)

21151 APTIC NO. 40569

Cox, A. P.

ACID TAR DISPOSAL FROM PETROLEUM WORKS. *Disposal Ind. Waste Mat. Conf., Sheffield, England, 1956, p. 121-125, April, 1956. 3 refs.*

Waste acids from petrochemical plants contain 35-80% by weight of sulfuric acid and are contaminated with carbonaceous material; they can, however, be decarbonized and reconcentrated, or sold to other industries for use in processes such as fertilizer manufacture. Waste acids from the refining of light petroleum products contain about 50-60% by weight of sulfuric acid and 10% by weight of water, the balance being mainly dissolved sulfur compounds and nitrogen bases. They can readily be burned or, after dilution with water and separation of the oils, reconcentrated and used for fertilizer manufacture. Waste acids from alkylation processes are of about 90% by weight sulfuric acid content and can largely be re-used in other refining treatments. There are a number of ways used by the petroleum refining industry to dispose of their acid sludges, the method to be used depending on the type of sludge to be processed. Burning the sludge can be made to

21140 APTIC NO. 39893

Calaceto, Ralph R.

SLUDGE INCINERATOR FLY ASH CONTROLLED BY CYCLONIC SCRUBBER. *Public Works, 94(2):113-114, Feb. 1963.*

Fly ash from a Detroit municipal sludge incinerator is entrained in water droplets in a cyclonic jet scrubber with a precooler. The cyclonic principle used enables the incinerator exhaust gas to spin by means of a tangential gas inlet. As the gas spirals up through the scrubber, the fly ash particles collide with the injected water droplets from wall-mounted sprays. The dirty droplets are spun over to the wall and washed down to the drain; the clean gas is exhausted by a vane axial-type fan. Fly ash collection efficiency is 95.9%. The scrubber reduces the average grain loadings of 3.5 grains/cu ft to 0.145 grain.

21141 APTIC NO. 40953

Calaceto, Ralph R., Reuben H. Durst, and David Miller

SCRUBBERS WITH ADJUSTABLE VENTURIS. *Slick Industrial Co., Summit, N. J.) U. S. Pat. 3,638,924. 5p., Feb. 1, 1972. 10 refs. (Appl. Aug. 22, 1968, 1 claim).*

A gas scrubber is described which has an adjustable venturi throat to receive the gas to be cleaned as well as the liquid for cleaning the gas. The adjustable venturi throat has a pair of inner straight parallel edges which extend perpendicular to the central axis of the venturi and which are situated in a plane normal to the central axis. These inner edges are equally and oppositely displaced by the adjustable venturi to define its smallest throat area. This adjustable venturi throat structure includes a pair of tiltable baffle plates having inner edges which define the inner edges of the venturi throat. The liquid is supplied in sheets between which the gas flows centrally through the venturi, so that the liquid is directed transversely across the gas at the venturi throat with the accelerated gas bursting through the liquid to shatter it into minute droplets. (Author abstract modified)

21142 APTIC NO. 40725

Cetinbas, Abdurrahman, R. P. Vinson, Joseph Cervik, and M. G. Zabetakis

METHANE AND DUST CONTROL BY WATER INFUSION. PITTSBURGH COALBED (FAIRVIEW, W. VA.). *Bureau of Mines, Pittsburgh, Pa., Pittsburgh Mining and Safety Research Center and Bureau of Mines, Pittsburgh, Pa., Methane Control and Ventilation. Rept. Investigations 7640, 20p., 1972. 11 refs.*

The effect of water infusion on the flow of methane and on the production of dust was investigated at an active face in the Pittsburgh coalbed near Fairview, West Virginia. The average total flow of methane at the face decreased by approximately 79%, whereas the flow from the ribs increased about 24% after infusion. Infusion holes 55-127 ft and 100-300 ft apart were effective in this respect for at least 5 days. On the day after infusion, dust concentrations appear to have been reduced; however, the presence of large quantities of rock dust obscured the results on the following days. The procedures described here can be incorporated into the mining cycle if the drill crews operate during idle shifts or over a weekend, making it possible to increase the level of safety materially with no loss in face productivity. Additional work is required to determine the effect of water infusion on the rate at which coal is mined and dust is produced, and to establish optimum hole depths and water infusion levels. (Author abstract modified)

21143 APTIC NO. 39866

Chapoux, Edouard

REVIEW PAPER ON AIR POLLUTION. *(Etat de la question pollution de l air). Text in French. Society of Automotive Engineers, Inc., New York and Federation Internationale des Societes d Ingenieures des Techniques de l Automobile, Brussels (Belgium), Intern. Auto. Safety Conf., Proc., Brussels, Belgium, 1970, 21p. (Paper 15.3.A.)*

The automobile as a primary cause of air pollution is reviewed. The most recent criteria published by the State of California concerning the limitation of air pollutants in order to maintain an acceptable environment are examined, together with the limits which will be imposed upon vehicles in the United States in the future. American and European regulations are compared. Different control possibilities available to the manufacturer are indicated, and various methods to make the automobile cleaner are cited.

21144 APTIC NO. 40665

Cheng, L., S. K. Tung, and S. L. Soo

ELECTRICAL MEASUREMENT OF FLOW RATE OF PULVERIZED COAL SUSPENSION. *Trans. ASME (Am. Soc. Mech. Engrs.), 92(A-2):135-145, April 1970. 17 refs. (Presented at the American Society of Mechanical Engineers, Winter Annual Meeting, Los Angeles, Calif., Nov. 16-20, 1969, Paper 69-WA/Pwr-1.)*

Electrostatic probes for indicating the instantaneous flow rate of a pulverized coal suspension in a pipe were devised and tested. Experiments were performed on flow systems consisting of two and five inch-ID pipes with mass flow ratios of up to 0.66 lbs of coal/lb of air at up to 115 ft/sec air velocity. Calibrations were made with a differential isokinetic sampling technique. With accurate control of probe potential, consistent indication of electrostatic ball probes was at the 1 times 10 to the 8th power amp level, and at the 1 times 10 to 9th power amp level with cylindrical probes. Accuracy within 1% was feasible. Since the probe output is an electrical signal, this device makes an integrated control system, including the coal line, feasible. Instantaneous and accurate fuel adjustment into furnaces facilitates air pollution control. (Author abstract modified)

21145 APTIC NO. 40383

Cir, Jaroslav and Rudolf Kubicka

HYDRODESULPHURIZATION OF PRIMARY AND SELECTIVELY PREPURIFIED CRUDE OIL DISTILLATION RESIDUES. II. DIRECT HYDRODESULPHURIZATION - CATALYSTS USED- CONCLUDING REMARKS. *(Hydroentschwefelung von primaeren und selektiv vorgereinigten Rohoel-Destillationsrueckstaenden. II. Direkte Hydroentschwefelung - Verwendete Katalysatoeren - Schlusswort). Text in German. Erdoel Kohle (Hamburg), 25(4):181-183, April 1972. 1 ref.*

Mazut can be directly desulfurized with special catalysts such as Ni-Mo-Al203 and Co-Mo-Al203. The desulfurization capacity of the two catalysts is similar with the exception that the Ni-Mo-Al203 catalyst removes nitrogen compounds better. The degree of desulfurization is greatly influenced by the temperature. An increase of the hydration temperature from 360 to 400 C raises the average degree of desulfurization from 62 to 87%. At a desulfurization to 1% sulfur the lifetime of the catalyst is at least 6 mo. The distillates obtained with the direct hydrodesulfurization have similar properties to those obtained by hydrodesulfurization of the deasphaltized products. Direct hydrodesulfurization requires a simpler technology and lower investment cost compared with the separate desulfurization of the vacuum fraction and the deasphaltized residue.

21146 APTIC NO. 40702

Cir, Jaroslav and Rudolf Kubicka

HYDRODESULFURIZATION OF PRIMARY AND SELECTIVELY PREPURIFIED CRUDE OIL DISTILLATION RESIDUES. I INTRODUCTION - QUALITY OF THE RESIDUES - HYDRODESULFURIZATION AFTER DECOMPOSITION BY DISTILLATION.

(Hydroentschwefelung von primaeren und selektiv vorgereinigten RohoeltDestillationsrueckstaenden. I. Einleitung - Beschaffenheit der Rueckstaende - Hydroentschwefelung nach destillativer Auftrennung). Text in German. Erdoel Kohle (Hamburg), 25(3):123-130, March 1972. 22 refs.

Using Romaschkino oil as an example, a fuel oil desulfurization process is discussed which comprises the decomposition by distillation of mazut into vacuum oil and vacuum residue by selective deasphaltization and desulfurization. A low-sulfur fuel oil can then be recovered by mixing the two desulfurized products. The degree of desulfurization which can be achieved depends on the asphaltene concentration and rises with increasing reaction pressure. An initial reaction temperature of 350 C is required even if the catalyst is fresh, since the sulfur compounds in the deasphaltized product have a higher resistance to hydrolysis. With increasing deactivation of the catalyst the temperature can be raised from 350 to 430 C. The desulfurization is better if a catalyst with a large geometric surface is used. The desulfurization of the deasphaltized products was tested on a small scale model. The results led to the erection of a plant for the annual desulfurization of 1 million tons of mazut. The hydrodesulfurization of the vacuum oil to a residual sulfur concentration of 0.2 to 0.4% is carried out at pressures of 50 to 100 bar. The lifetime of the catalyst is at least 24 mo. A maximum of 0.20 kg catalytic mass/1 ton low-sulfur fuel oil is required. The production of low-sulfur fuel is accompanied by the production of elemental sulfur. Direct hydrodesulfurization of mazut will be discussed in Part II.

21147 APTIC NO. 40013

Clouse, R. L.

PRELIMINARY DESIGN OF A MECHANICAL-DRAFT COUNTERFLOW COOLING TOWER. *ARO, Inc., Arnold Air Force Station, Tenn., Air Force Systems Command Contract F40600-72-C-0003, ARO Proj. BE2151-A11 ARO-ETF-TR-71-162, AEDC-TR-71,213. Program Element 64719F, 41p., Oct. 1971. 14 refs.*

NTIS: AD 731193

The need for a method whereby the preliminary design of a cooling tower can more easily be specified has existed for many years. The numerical techniques commonly used to solve the Merkel cooling tower equation are not adaptable to a direct general solution. A direct solution to the Merkel equation is presented which, when combined with certain detailed experimental data by others, yields a relatively quick and straightforward method of establishing the preliminary design of a mechanical-draft counterflow cooling tower. Special attention is devoted to cooling tower applications relative to high altitude engine test facilities. Tower characteristics are discussed versus water temperature ranges. (Author abstract modified)

21148 APTIC NO. 40235

Collins, A. C.

ATMOSPHERIC POLLUTION BY SULPHUR DIOXIDE. *Rep. Prog. Appl. Chem., vol. 55:643-663, 1970. 114 refs.*

Various aspects of atmospheric pollution by sulfur dioxide are reviewed. During the past 10 years, SO2 has been singled out as particularly harmful and has been linked to occurrences of smog-causing deaths. Catalytic and photolytic oxidation and other reactions of SO2 in the atmosphere are considered. The effects of SO2 on health range from slight irritation and increased pulmonary resistance to emphysema and increased mortality rates due to chronic lung diseases. The effects on vegetation, materials, and economics are also discussed. The major sources of SO2 emissions are industries, e.g., power plants, ore smelting, and petroleum refining, and domestic use of high-sulfur fuels for heating. Control methods to prevent emissions of SO2 into the atmosphere include desulfurization of fuels, e.g., selective pulverization, froth floatation, magnetic separation, bacterial action, hydrogenation, solvent refining, and hydrodesulfurization, and SO2 removal from the processes through alkaline additive techniques, wet scrubbing, absorption, catalytic oxidation, the Reinluft process, alkalized alumina, manganese dioxide systems, Claus processes, and process modifications. Data on economic costs of SO2 damage, SO2 emissions, sulfur contents of coals and oils, and cost estimates for controls are tabulated.

21149 APTIC NO. 39946

Colucci, J. M. and G. J. Barnes

THE EFFECT OF EXHAUST SYSTEM GEOMETRY ON EXHAUST DILUTION AND ODOR INTENSITY. *Preprint, Society of Automotive Engineers, Inc., New York, 11p., 1971. 2 refs. (Presented at the Automotive Engineering Congress, Detroit, Mich., Jan. 11-15, 1971, Paper 710219.)*

Diesel exhaust gas dilution and odor intensity were measured in the immediate vicinity of a transit bus equipped with a rear-mounted horizontal exhaust pipe, a rear-mounted vertical exhaust pipe, and a roof-top diffusion system to determine the effect of exhaust system geometry. Exhaust dilution ratios were measured indoors during vehicle idle operation, using propane added to the exhaust gas as tracer. Exhaust odor intensities were measured indoors during idling by a human panel, using a threshold odor-measurement technique. Dilution of exhaust gas around the bus averaged about eight times greater with the vertical exhaust pipe than with the horizontal pipe. Odor intensity, as measured by the threshold response distance, was about 35% less with the vertical pipe than with the horizontal pipe. The roof-top diffuser was not as effective as the vertical exhaust pipe in increasing exhaust gas dilution or in reducing exhaust odor intensity. (Author abstract modified)

21150 APTIC NO. 40002

Cornelius, George W.

AFTERBURNER APPARATUS HAVING LINED BURNER CAN. *(Assignee not given.) U. S. Pat. 3,641,768. 4p., Feb. 15, 1972. 8 refs. (Appl. Feb. 20, 1970, 8 claims).*

This afterburner may be substituted for the muffler in a conventional automobile exhaust system. The flame chamber is constructed of relatively low thermal capacity material, thus producing a minor amount of quenching and allowing relatively complete combustion of combustibles. High temperature may be achieved in a relatively short period of time. The flame is projected forward to cause early combustion. A pilot burner is mounted in the chamber and a means is provided to control the rate and ratio of fuel and air in response to various engine speeds and conditions. (Author summary modified)

21151 APTIC NO. 40569

Cox, A. P.

ACID TAR DISPOSAL FROM PETROLEUM WORKS. *Disposal Ind. Waste Mat. Conf., Sheffield, England. 1956, p. 121-125, April, 1956. 3 refs.*

Waste acids from petrochemical plants contain 35-80% by weight of sulfuric acid and are contaminated with carbonaceous material; they can, however, be decarbonized and reconcentrated, or sold to other industries for use in processes such as fertilizer manufacture. Waste acids from the refining of light petroleum products contain about 50-60% by weight of sulfuric acid and 10% by weight of water, the balance being mainly dissolved sulfur compounds and nitrogen bases. They can readily be burned or, after dilution with water and separation of the oils, reconcentrated and used for fertilizer manufacture. Waste acids from alkylation processes are of about 90% by weight sulfuric acid content and can largely be re-used in other refining treatments. There are a number of ways used by the petroleum refining industry to dispose of their acid sludges, the method to be used depending on the type of sludge to be processed. Burning the sludge can be made to work efficiently, but does not make full use of the potential economic value of the sludge. The hydrolysis method is rather restricted in application and can be troublesome to operate. Decomposition of the sludge is the most attractive method, by either the high or low-temperature process. However, plants of this type need a large capital outlay and so are only economic for a large refinery. If there are a number of smaller refineries fairly close together it should be possible for one of them to operate a decomposer to which all send their sludge and from which all receive sulfuric acid and oleum. (Author conclusions modified)

21152 APTIC NO. 40568

Crabaugh, Hoyt R., Andrew H. Rose, Jr., and Robert L. Chass

DUST AND FUMES FROM GRAY IRON CUPOLAS--HOW THEY ARE CONTROLLED IN LOS ANGELES COUNTY. *Air Repair, 4(3):125-130, Nov. 1954.*

The characteristics of the pollutant involved in a control equipment design problem, and the characteristics of the gaseous conveying medium, are fundamentally a function of the process equipment under consideration, in this case a cupola producing gray iron. Pollutants discharged from a gray iron cupola are predominantly solids, and approximately 25% of the total weight discharged to the atmosphere is in the particle size range of 0-10 micron. Chemical analyses of the inorganic portions of the dusts and fumes discharged are indicated. Of major importance from a design standpoint is the temperature of the gas stream. Physical and operational limitations of the types of control equipment contemplated and the efficiency required must also be considered. In making an engineering evaluation necessary to design an effective control installation for a gray iron cupola, the problems of temperature control and gas conditioning are of prime importance. This phase of the problem is aided through the use of radiation and convective columns or through the use of evaporative coolers. Several examples utilized in the Los Angeles area are described: one employing radiation and convective cooling and a baghouse; a baghouse system and evaporative coolers; and electrical precipitator; and a gas-fired reverberatory furnace.

21153 APTIC NO. 40547

Craig, J. W. T., G. L. Johnes, G. Moss, and J. H. Taylor

STUDY OF CHEMICALLY ACTIVE FLUID BED GASIFIER FOR REDUCTION OF SULFUR OXIDE EMISSIONS. *Esso Research Centre, Abingdon (England). Air Pollution Control Office Contract CPA 70-46, Rept. APTD-0721, 87p., Feb. 22, 1971. 9 refs.*

NTIS: PB 202221

The chemically active fluid bed (CAFB) gasifier was designed to eliminate sulfur dioxide pollution during the combustion of high sulfur fuel oils. The fluidized bed of lime partially oxidizes, gasifies, and completely desulfurizes heavy fuel oil. Calcium sulfide forms in the gasifier and is converted back to calcium oxide in a fluid bed regenerator by contact with air. Sulfur leaves the system as 10-15% SO2 in the hot gas from the regenerator; the SO2 can be recovered. Vanadium is removed as an additional benefit. The gasifier process is potentially applicable to existing power plant installations. Replacement of about 1.75 wt of calcium oxide/wt of sulfur maintains the sulfur removal efficiency at close to 100%. The CAFB removes 20% of fuel sodium.

21154 APTIC NO. 39823

Craig, Ollison

ABATEMENT OF DUST FROM POWER PLANT STACKS. *Interdepartmental Committee on Air Pollution, Washington, D. C., Air Pollut., Proc. U. S. Tech. Conf., Washington, D. C., 1950, p. 443-447. (May 3-5, Louis C. McCabe, ed.)*

The problem of dust control from power plant stacks, the principles involved, and types of equipment are briefly described. The amount of dust carried through a boiler depends upon the method in which the solid fuel is burned, the size and characteristics of the fuel, and the fuel-burning rate. Ordinances vary in their provisions for permissible emissions of dust from stacks, but in general there is an increasing tendency to limit by law the amount of effluent solids. Equipment for separating solid particles from flowing boiler gas and collecting the particles for removal includes mechanical collectors, electric precipitators, and wet collectors. Efficiencies vary from 85 to 80%, 90 to 95%, and 85 to 90% respectively.

21155 APTIC NO. 39993

Croft, Brian H.

PRINCIPLES AND APPLICATION OF AN ELECTRONIC INJECTION SYSTEM TO GASOLINE ENGINES. *(Principes et applications aux moteurs a essence d un systeme d injection electronique). Text in French. Ingrs. Automobile (Paris), 44(7):378-385, July 1970.*

The advantages of electronically controlled fuel injection are, basically, attainment of optimum conditions concerning torque and fuel consumption, and cutting down air pollution caused by unburned hydrocarbons and carbon monoxide. Emission of carbon monoxide can be greatly reduced because: it depends primarily on the richness of the combustion mixture which can be very accurately controlled; with the electronic control system, the quantity of injected fuel can be very precisely regulated; each cylinder receives the same quantity of combustible. The conventional carburetor is eliminated with this system. The fuel supply system includes a filter ahead of the electrically controlled fuel pump. The latter pushes the gasoline into the injectors which are opened by solenoids, the quantity of injected fuel is proportionate to the opening time. Air pressure, air temperature, engine speed, and temperature of cooling water are constantly signalled to the electronic control unit which in turn controls the richness of the combustion mixture. The control unit includes two pulse generators, each connected to half of the engine injectors, i.e., four injectors in the case of an eight-cylinder engine. The pulses of the generators are controlled by a distributor which rotates at half the engine speed.

21156 APTIC NO. 39959

Daly, C. F.

WATER SPRAY METHOD SUPPRESSES SMOKE FROM BURNING WASTE PETROLEUM GAS. *Ind. Eng. Chem., vol. 48:101A, Feb. 1956.*

Based on test results, a smoke suppressor using four small spray nozzles 90 deg apart and three slightly larger spray nozzles 120 deg apart was designed for a large (12 ft in diameter, 35 ft high, 15 million cu ft daily capacity refinery) ground flare. All nozzles are 3 in. above the flare tip on a base circle of 36-inch diameter. Each bank of nozzles is individually controlled from its own supply header to permit close control of the total amount of water spray. All suppressor parts are of stainless steel to resist heat and corrosion. During 18 mo of operation, the suppressor has effectively eliminated any possible smoke and has been economical to operate.

21157 APTIC NO. 40006

Dayton, Stan

WET SCRUBBING OF WEAK SO2 GETS A TRIAL AT NEW MCGILL PILOT PLANT. *Eng. Mining J., 172(12):66-68, Dec. 1971.*

Wet scrubbing of smelter gases is used as a control method in a new pilot plant at the McGill reduction plant of Kennecott Copper Corp. s Nevada Mines Division near Ely, Nevada. Preliminary results were revealed by the Smelter Control Research Association. Test results are analyzed by computer. Limestone scrubbing require about 8 lbs limestone per pound sulfur treated, raising a problem for custom smelters or those located far from the concentrator because of lack of a tailing pond. At such locations, wet scrubbing systems can be viewed as trading an air pollution problem for a solid waste problem.

21158 APTIC NO. 40419

Doornum, G. A. W. van, A. C. Bonapace, and H. T. Sorgnit

SMOKELESS COMBUSTION OF BITUMINOUS COAL IN DOMESTIC APPLIANCES-- PART III. *Coal, Gold and Base Minerals of S. Africa, 20(1):37, 39, 41, 43, 45, 47, 49, March 1972. 5 refs.*

A combustion chamber design that permits rapid heating and maintenance of hot plate temperatures for relatively short periods of time has been developed for households where the husband and wife both work. Flue gas temperatures can be maintained at temperatures ranging from 300 C to 700 C. Smoke generation can be practically eliminated by using at least 500 g of kindling wood during lighting up. Coal can also be used in the stove.

21159 APTIC NO. 40555

Downs, J. J.

OPERATIONAL EXPERIENCE WITH A DIRECT EVACUATION SYSTEM. *Preprint, American Foundrymen s Society, Des Plaines, Ill., 3p., 1970. (Presented at the Total Environmental Control Conference, Ann Arbor, Mich., Nov. 16-19, 1970, Paper IV-3.)*

A dust collector system for a jobbing steel foundry producing plain carbon and low alloy steel castings was described. The system is a knocked down pressure type, having a net cloth area of 5860 sq ft to filter 14,000 cu ft/min of electric furnace fume laden air at an air to cloth ratio of 2.39 to 1.0. Fumes are removed directly from the furnace through a hole in the roof to a stainless steel duct leading to a baghouse. There is a damper to control exhaust velocity in the system. A 100 hp blower draws fumes through the system and discharges them into the baghouse. Between the blower and the baghouse is a by-pass which directs the air flow to the atmosphere instead to to the baghouse during the times when the furnace fumes are not being collected or if the temper air damper cannot control gas temperature.

21160 APTIC NO. 40516

Drkal, Frantisek

A THEORETICAL SOLUTION TO THE PROBLEM OF CIRCULAR PERIPHERAL EXHAUSTING. *(Teoreticke reseni kruhoveho odsavani). Text in Czech. Zdravot. Tech. Vzduchotech., 13(2):91-99, 1970. 5 refs.*

Peripheral removal of vapors by suction from circular tanks is used in conjunction with furnace tanks, electroplating vats, and case-hardening tanks. The calculation of circular peripheral suction has hitherto been based on experimental data. A simplified theoretical calculation is proposed for the removal by suction of a symmetrical circular flow of vapors emanating from an incompressible liquid in the tank. The practical application of the method is encumbered by the limited possibilities of constructing a mathematical model for circular peripheral flow from circular tanks. For purposes of calculation, the flow is considered symmetrical around the vertical axis of the circular tank. The flow superposition method is applied to the axially symmetrical flow above the bath surface which consists of two components, the flow emanating from the surface of the bath and the flow in the circular exhaust slit. The volume of vapors to be drawn off is calculated from flow elements whose potential function is known by reference to the maximal height of the median line of the air current. The theoretical results obtained are compared with the results of a similar solution proposed for bilateral exhausting of circular baths.

21161 APTIC NO. 40578

Dunham, G. S.

SOCONY MOBIL S POLLUTION-CONTROL POLICY AND PROGRAMS. *Proc. Am. Petrol. Inst., Sect. III, vol. 36:306-308, 1956.*

The air and water pollution control programs at several refineries throughout the U. S. are described. At a major Los Angeles plant, a covered oil-water separator has been installed to prevent the escape of vapors from waste-water disposal. Either floating roofs or vapor-recovery systems have been installed on refinery tankage and a new device is being used at truck loading racks to collect gasoline vapors. Hydrogen sulfide is stripped from refinery gases before the gases are burned as refinery fuel. The recovered H2S is piped to an outside chemical plant for conversion to elemental sulfur. Dust collectors are used on cracking units to catch catalyst dust. Stack dust emissions are only 1/4 of the permitted rate under Los Angeles Air Pollution Control District Rule 54. Improved flares are being installed which automatically mix vapors and air with steam to achieve smokeless combustion, as well as equipment to eliminate the steam plume and vapors emitted in the periodic blowdown of delayed coker drums. A total of $3 million was spent in the last eight years for air pollution control at this refinery.

21162 APTIC NO. 40302

Ells, Frank J.

AIR POLLUTION PROBLEMS IN PETROLEUM REFINING. *Am. Ind. Hyg. Assoc. J., 19(4):313-316, Aug. 1958. (Presented at the American Industrial Hygiene Association, Industrial Health Conference, Atlantic City, N. J., April 24, 1958.)*

Various air pollution problems and control methods in petroleum refining are reviewed. A variety of tanks with floating roofs or cone-roofed with conservation vents and microbaloons may be used to retard evaporation from storage tanks. Sources of pollution from losses in processing include vacuum jet discharge which could be eliminated by hooding the sump and conducting the gases by means of a blower and duct system; plumes from catalytic cracking units, which were modified so that air could contact the catalyst as it enters and eliminate the plume; the disposal of hydrogen sulfide formed from sulfur contained in crude oils through removal from the wet gas by scrubbing with a di ethanol amine solution or caustic soda or oxidation to thiosulfates and sulfates by means of a water oxidizer; and the removal of fumes from thermofor clay burners through a two stage scrubber. Properly designed fuel oil systems and combustion controls will greatly reduce smoke incidents of furnaces; haze detectors connected to recorders and alarms will alert operators. Flares are equipped with steam aspirators to permit smokeless combustion.

21163 APTIC NO. 40534

Falkenhain, Gerd, Peter Riedel, Ulf Benke, and Herbert Wiebe

DESTRUCTION OF ORGANIC SOLVENT VAPORS FOR THE PURPOSE OF MAINTAINING A CLEAN AIR. *(Vernichtung von organischen Loesungsmitteldaempfen zum Zwecke der Luftreinhaltung). Text in German. Staub, Reinhaltung Luft, 32(5):212-217, May 1972. 6 refs.*

Experiments for the thermal destruction of m-xylene, butanol, n-hexane and 1,1,1-trichloroethane were carried out in an experimental combustor. The combustion air was preheated, mixed with the solvent vapor, and passed to the combustor as secondary air. The waste gas was analyzed. The combustor was operated with natural gas. For the experiments with m-xylene, temperatures of 265, 320, and 400 C were selected. With the three other solvents the mixture always had a temperature of 400 C. The solvent concentration in the air was varied. The experiments showed that preheating of the solvent-laden air to 400 C is necessary for the achievement of good results. At solvent concentrations of less than 15 g solvent/cu m air up to 200 ppm C2-hydrocarbons were measured. The same was true for concentrations of more than 200 g solvent/cu m air. Thus, thermal combustors operate most efficiently with solvent concentrations between 20 and 200 g/cu m. At the thermal destruction of m-xylene, i-butanol, and n-hexane vapors, only cracking products of these solvents were found in the waste gas; no products of a partial oxidation were found. The experiments with 1,1,1-trichloroethane have shown that the thermal destruction of these highly chlorinated hydrocarbons is inefficient.

21164 APTIC NO. 40611

Fant, B. T. and Jose A. Rionda

MODERN APPROACHES TO FUEL OIL DESULFURIZATION. *Preprint, American Society of Mechanical Engineers, New York, 23p., 1971. (Presented at the American Society of Mechancial Engineers Joint Power Generation Conference, St. Louis, Mo., Sept. 1971.)*

The basic technical features of three fuel oil desulfurization processing routes are described: vacuum distillation followed by desulfurization of vacuum gas oils (GO-fining); desulfurization of atmospheric residua (RESIDfining); and vacuum distillation followed by coking of vacuum residua (Flexicoking) followed by desulfurization of vacuum and coker gas oils (GO-fining). The first two are hydrodesulfurization processes while Flexicoking is a recent development integrating conventional fluid coking with gasification of the coke. Refining schemes are described to illustrate how process selection and operation depend upon the target fuel oil sulfur level. Typical economics are shown to illustrate the dependence of the cost of producing these low-sulfur fuels on feed type, feed sulfur content, and the desulfurization level desired. The GO-fining/Flexicoking combination is the best processing route for achieving sulfur levels below .5%.

21165 APTIC NO. 40567

Fawley, Norman E.

AIR POLLUTION CONTROL MEASURES AT BALTIMORE REFINERY. *Air Repair, 3(3):152-154, Feb. 1954.*

Results of a survey initiated by a Baltimore area refinery to study the existing pollution situation indicated that combustion operations constitute the major portion of the problem and that miscellaneous process operations involving complex compounds may also be potential sources of pollution. The refinery deals with such materials as hydrogen sulfide, light hydrocarbons, acid mist, asphalt oxidizing products, and mercaptans. Key personnel were organized to handle and investigate pollution complaints. One project undertaken was the injection of steam into the main refinery flare as a means of minimizing soot and black smoke emission. Smoke density recorders and indicators were installed on each of the five boilers at the main boiler house. A fuel gas surge drum is being installed at the boiler house, and floating roofs are being installed on the crude storage tanks. Asphalt fumes are subjected to high temperature oxidation, and effluent gases are scrubbed to remove sulfuric acid mist and sulfur dioxide.

21166 APTIC NO. 40366

Fernandes, J. H.

CONTROLLING COMBUSTION-CAUSED AIR POLLUTION. *(Bestrijding van de luchtvervuiling afkomstig van verbrandingsbronnen). Text in Dutch. Polytech. Tijdschr., Ed. Procestechniek (The Hague), 26(15):176-190, March 1972. 19 refs. (Presented at Rotterdam, Netherlands May 25-26, 1971.)*

Various systems and equipment applied for air pollution control in the United States are reviewed. Improvements in technology, waste gas cleaning, and applying optimum emission conditions are the three basic means for controlling air pollution. Examples for minimizing pollution by technological improvements are given (steam boiler, standard boiler equipped with Loddby hearth, Air Contact Evaporator system for cellulose industry, and flue gas cleaning system for incinerators). Different types and principles of dust separators are described (spiral and rotary cyclones, scrubbers, venturi scrubbers, electrostatic filters, and tissue filters). Electrostatic filters, requiring direct voltages of 15,000 to 100,000 volts, have efficiencies over 99% for a wide range of particle sizes. The efficiency of tissue filters lies in about the same order of magnitude. Wet or dry absorption, catalytic oxidation, the use of low-sulfur fuels, fuel additives, or low excess air are the most important means of abating sulfur dioxide emissions. Dry absorption of sulfur dioxide occurs in the alkalized alumina process at 330 C, while the catalytic oxidation to sulfur trioxide at 500 C is followed by cooling in economizer and in contact with cool sulfuric acid, respectively. The sulfuric acid obtained is of 80% concentration, and an efficiency of 90% is reached. A process developed by Combustion Engineering is described. For the control of nitrogen oxides, low excess air of 1-5% is best. The problem of creating optimum emission conditions to minimize pollutant concentrations can be effectively solved by applying high stacks and high emissions speeds.

21167 APTIC NO. 40541

Fett, Walter

AIR EXCHANGE AND WASTE GAS ENRICHMENT IN NATURALLY VENTILATED ROAD TUNNELS. *(Luftaustausch und Abgasansammlung in natuerlich beluefteten Autotunnels). Text in German. Gesundh. Ingr., 93(5):129-137, May 1972. 10 refs.*

Based on the results of measurements of the carbon monoxide concentration and the traffic frequency in inner-city car tunnels, a model for the air exchange in tunnels with one separated tube in each direction was developed. An application of the model to two other car tunnels yielded satisfactory agreement with measured values. The most influential parameters were the air flow which is induced by the cars and the air exchange between the two tunnel tubes at the tunnel end. This undesired air exchange can be avoided by staggering the ends of the two tunnel tubes or by carrying the separating wall between the tunnel tubes beyond the tunnel ends to the normal road level. This would reduce the pollutant concentration inside the tunnel considerably and the maximum allowable tunnel length could be increased considerably.

21168 APTIC NO. 40081

First, Melvin W.

REBUTTAL OF CRITIQUE. *J. Air Pollution Control Assoc., 10(1):5, 16, 93, Feb. 1960.*

A critique of a paper on the effectiveness of odor counteractants for the treatment of stack gases is answered. Personnel working in a plant containing odors are especially sensitive to them by reason of their long familiarity, but their subjective response is tempered by the same familiarity. Odor counteraction is not always effective in controlling stack odor problems. A simple two-point scale is all that is needed to determine individual acceptance or nonacceptance of a specific odor.

21169 APTIC NO. 40647

Forster, A.

LIQUID MANURE AND ENVIRONMENT PROTECTION. *(Fluessigdung Umweltschutz). Text in German. Landtechnik, no. 8:166-168, April 1972.*

Since a great number of farmers use liquid feces as manure on their fields because transportation costs for the liquid substance are 30 to 40% lower than for the solid matter. Several European governments provide for special environmental protection measures to be applied for the utilization of liquid manure. In Sweden and Switzerland, storing of the liquid for

4-9 months is obligatory because after this time a great number of pathogenic microorganisms are destroyed and the danger to the environment is considerably reduced. Another reason for storing the liquid is that during special periods like holidays or during high pressure conditions, the spraying of liquid feces onto the fields is not allowed because of the formation of bad odors. In order to avoid bad odors and to destroy microorganisms, great farms will have to provide for the deodorization before distributing the liquid substance onto the fields. Deodorization can be effected mechanically, thermally, chemically, or biologically, the latter method seems to be the most perfect and most economic one. The biological treatment can be carried out in a cold, warm, and a hot way. The cold method has the disadvantage that the fertilizing value of the liquid feces is extremely low. The solid substances in the liquid after deodorization are of a fibrous consistency so that the feces treated in this manner can be distributed by means of a spraying device without causing incrustions. However, the installation of a spraying device for feces distribution will only be economical for farms with an annual feces production of more than 8000 to 10,000 cu m.

21170 APTIC NO. 40189

Furen, E. L., D. V. Gernet, T. A. Semenova, and M. P. Shmigirovskaya

EFFECT OF THE PREPARATION CONDITIONS OF AN IRON-CHROMIUM CATALYST FOR THE CONVERSION OF CARBON MONOXIDE ON ITS ACTIVITY, STRENGTH, AND POROUS STRUCTURE. II. PREPARATION OF THE CATALYST FROM A PASTE.

Kinetics Catalysis (USSR) (English translation from Russian of: Kinetika i Kataliz), 12(5):1137-1142, May 1972. 11 refs.

Samples of a bidisperse iron-chromium catalyst with different coarsely porous structures were prepared by forming them from pastes with different moisture contents. The dependences of the activity and the strength on the parameters of the coarsely porous structure and on the grain size of the catalyst were established. Effective diffusion coefficients were calculated for catalysts with different porous structures. The optimal catalyst for the conversion of carbon monoxide at atmospheric pressure is a bidisperse catalyst with a granule size of 5 mm, having a volume of the large pores equal to 0.10 to 0.15 cu cm/g. This catalyst has also sufficient mechanical strength, 50 to 60 kg(force)/sq cm.

21171 APTIC NO. 40059

Gajewski, Antoni, Stefan Kupiek, and Jan Zygadlo

INVESTIGATION ON CATALYTIC REDUCTION OF EXIT NITRIC OXIDES BY AMMONIA.

(Badanie katalitycznej redukcji odlotowych tlenkow azotu amoniakiem). Text in Polish. Przemysl Chem., 51(1):44-46, 1971. 9 refs.

A process for the catalytic reduction of nitrogen oxides in stack gases from nitric acid plants was tested on the quarter and semicommercial scales. The process was examined over a 0.2% platinum-on-alumina catalyst, in a reduced-scale unit (one-quarter size). At a flow rate of 40 cu m/l/hr, gases containing 0.3% nitrogen oxides with an average of 15-20% degree of nitrogen oxidation and 4-6% oxygen were reduced approximately 100%. The degree of conversion dropped with rising temperature and content of nitrogen oxides. The optimum conversion temperature was 10-15 C above that for the start of reaction, and the optimum ammonia/nitrogen oxide ratio ranged from 1.5:1 to 2:1. At higher than 2.5:1 ammonia/nitrogen oxide ratio, ammonia was converted to nitrogen oxides. No ammonia nitrate was formed. These results were confirmed in a semicommercial unit of 300 cu m/hr capacity, yielding an outlet gas containing 0100-200 ppm nitrogen oxides and less than 0.001% ammonia.

21172 APTIC NO. 39821

Garvey, James R.

DESIGN AND USE OF SMOKELESS HAND-FIRED RESIDENTIAL COAL-BURNING EQUIPMENT.

Interdepartmental Committee on Air Pollution, Washington, D. C., Air Pollut., Proc. U. S. Tech. Conf., Washington, D. C., 1950, p. 422-430. 3 refs. (May 3-5, Louis C. McCabe, ed.)

The development and design of a smokeless coal burner is described. Cross-feed burning, a new coal-burning principal where the air for combustion passes laterally through the fuel bed rather than vertically, is applicable to both furnaces and boilers as well as heaters. Unlike the conventional burner, there is no direct connection between the top of the fuel chamber and the stack; instead a cast-iron plate effects a seal between the two. In addition, the inner chamber of the unit is divided into two sections, one a magazine for fuel burning and the other a passage for the products of combustion. Primary air for combustion is admitted at the left side of the unit opposite the arch and moves across the fuel bed at right angles to the downward flow of the fuel. The smokeless space heaters now being sold are retailing for 15-20% above the price of a conventional coal-burning magazine-type heater of comparable size and appearance.

21173 APTIC NO. 40354

Geiger, I., H. Heitland, P. Hofbauer, and E. Hoffmann

POSSIBILITIES FOR THE IMPROVEMENT OF THE EXHAUST GAS OF OTTO ENGINES THROUGH ENGINE MODIFICATION.

(Moeglichkeiten zur Verbesserung des Abgasverhaltens von Ottomotoren durch innere motorische Massnahmen). Text in German. Motortech. Z. (Stuttgart), 33(5):195-206, May 1972. 12 refs.

The development of various automotive exhaust gas components (hydrocarbons, carbon monoxide, oxides of nitrogen) is reviewed. The unburned hydrocarbons in the exhaust gas stem from an incomplete combustion process. A suitable measure for a more complete combustion is the intense mixing of the charge prior to and during combustion. The shape of the combustion chamber also has a marked influence on the combustion process. The spherical combustion chamber with its favorable surface/volume ratio produces 20 to 30% fewer hydrocarbons. Additional rotary movement of the charge brought no further improvement in emission characteristics. However, rotary movement was of benefit in the Heron combustion chamber, which at low rpm has a markedly higher hydrocarbon emission than the conventional combustion chamber. The spherical combustion chamber without additional rotary movement also has the lowest emission of nitrogen oxides. Other measures which improve the emission characteristics of Otto engines are better mixing of fuel and air through adequate gasoline injection and the addition of exhaust gas to the fresh gas. Layer charging primarily reduces the emission of oxides of nitrogen. All these measures can be achieved only at the cost of a power loss and higher fuel consumption. Engine modification can reduce emissions only by 20 to 30%. For further reduction afterburners must be installed.

21174 APTIC NO. 40414

Gelperin, N. I. and V. M. Tarasov

EQUIPMENT FOR CLEANING OF ALUMINUM ELECTROLYSIS SHOP-EMITTED GASES: EFFICIENCY AND INTENSITY OF OPERATION.

(Ob intensivnosti i effektivnosti apparatov dlya ochistki otkhodyashchikh gazov alyuminiyevykh elektrolizerov). Text in Russian. Zh. Prikl. Khim., 45(1):70-75, 1972. 9 refs.

Results of a comparative study of equipment for the removal of gaseous hydrofluoric acid, dust, and tar from aluminum electrolysis shop gases are described. Soda solution was used as absorbent in all cases. The relative characteristics of the different equipment were determined on the basis of efficiency, mass transfer, and energetic parameters, separately for electrolysis shops with lateral and top power supply. The efficiency for gaseous hydrofluoric acid was fairly high (90-98%), while the gas flow rates varied within a wide range of 0.9-6 m/sec. The rate of mass transfer, determining both the relative productivity and the efficiency, was highest in fluidized-bed scrubbers (18-23.4 m/sec), and lowest in scrubbing chambers (1.2 m/sec). The energetic parameters were lowest for fluidized-bed and high-speed scrubbers, and highest for cyclones. The rate of mass transfer for dust was best in fluidized-bed scrubbers and worse in foaming equipment (0.36 m/sec, energetic parameter 500 kg/sq m) which were hardly suitable for highly dispersed dust. The rate of mass transfer for tar products was best in fluidized-bed scrubbers and hydrodynamic dust collectors. Fluidized-bed scrubbers, satisfying sanitary standards in single-stage operation, were best regarding both intensity and efficiency for gases from electrolysis shops with lateral power supply, while none of the designs investigated was capable of meeting such standards in single-stage operation for electrolysis shops with top power supply.

21175 APTIC NO. 40561

Gockel, Jack L.

MAINTENANCE AND INSPECTION OF USED CARS. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 39p., 1970. 16 refs. (Presented at the Air Pollution Control Association, West Coast Section, Technical Meeting, 5th, San Francisco, Oct. 8-9, 1970.)*

The role of good maintenance and repair in keeping the exhaust emissions of an engine near its minimum pollution capability level was discussed. Proper maintenance, repair, and special adjustment of all cars on the road can reduce exhaust hydrocarbons by about 40%. Three-fourths of this reduction can be achieved by minor repair of 90% of the cars. On first impression, it appeared that the need for mandatory periodic inspection of used cars is to find the high emitters and enforce their repair. A cost effectiveness analysis of this plan shows it is the wrong approach, with a cost effectiveness index of $2.80/reaction ton/day/vehicle. The minor repair of 90% of the cars has a cost effectiveness index of $0.28/reactive ton/day/vehicle. The pollution tune-up procedure includes diagnosis of all engines, ignition system repair and adjustment, servicing of the PCV system, and special adjustment of the carburetor at idle. The equipment and diagnostic skills of the mechanics in the service industry need to be upgraded to reduce engines to their minimum pollution capability. Pass or fail type inspection tests are not effective because they do not reduce the exhaust emissions of all cars. In some cases, inherently high emitters are failed which cannot pass even after repair. Therefore, only diagnostic-type inspection should be considered. Mandatory inspection plans should avoid diagnosis and enforced repair by the same operator. This would prevent unfair treatment of car owners by unscrupulous operators.

21176 APTIC NO. 40411

Gupta, C. P. and P. K. Goel

AUTOMOTIVE VEHICLE EMISSIONS. *J. Inst. Engrs. (India) (Calcutta), 52(5):150-151, Jan. 1972.*

Automobile emissions, consisting of exhaust, evaporative, crankcase emissions, account for about 60% of the total pollutants in the air. In an attempt to reduce hydrocarbon exhaust emissions, two basic approaches have been tried: devices to oxidize certain components of fuel in the exhaust system and modification of engine design. Oxidation of fuel components in the exhaust can be achieved with catalytic and thermal reactors; in the case of catalytic reactors, problems involving lead poisoning of the catalyst and suitable materials for fabrication have been encountered. Regarding engine design approaches, there exists Chrysler s Clean Air Package System and Ethyl s recommendations for leaning idle mixture, homogenizing the air/fuel mixture, and retarding the spark advance at idle and low speeds. In an effort to reduce nitrogen oxide exhaust emissions, the following methods have been tried: exhaust gas recirculation, water injection into inlet manifold, exhaust manifold reactor with recycling, catalytic reduction, and lean operation. With evaporative emissions there are three types of losses from carburetor and fuel tank: diurnal, hot soak, and those during engine operation. Two popular methods of reducing these emissions are: (1) Esso s Charcoal Systems in which a charcoal canister collects and holds gas vapors from the fuel tank and carburetor until a purge valve opens to deliver the vapor into the manifold and (2) the Chevrolet Evaporative Control whereby gas vapors are routed from tank and carburetor to storage modules. Regarding crankcase emissions consisting mainly of blowby gases which comprise 70 percent 80 percent fresh air/fuel mixture and 20 percent 30 percent combustion products, several positive crankcase ventilation (P.C.V.) systems have been fitted to vehicles in the U.S.A. since 1963, completely eliminating these emissions. A table of present and future automobile emission control levels in the U.S.A. is supplied by the author.

21177 APTIC NO. 40381

Haenig, Gernot and Klaus Husmann

THE GRILLO-AGS PROCESS FOR DESULFURIZATION OF WASTE GASES. *(Das Grillo-AGS-Verfahren zur Entschwefelung von Abgasen). Text in German. Z. Erzbergbau Metallhuettenwesen, 25(4):175-181, April 1972. 13 refs.*

The Grillo-AGS desulfurization method, which is in its eighth year of development, is based on wet absorption using mixtures or compounds of magnesia and manganese oxides as absorbents. The efficiency of the method was tested under the operating conditions of an oil-fired steam boiler. At the same plant (8000 cu m/hr capacity), tests were conducted to determine whether, apart from sulfur dioxide a selective removal of sulfur trioxide at temperatures between 300 and 500 C is feasible. While in earlier experiments the absorption was carried out in spacious containers with diameters of 3 to 4 m and with gas residence times of several seconds in two stages, it later became feasible to desulfurize a waste gas flow of 27,500 cu m/hr in a single absorption tube 5 m long 0.8 m in diameter with an efficiency of more than 90%. At a pressure loss of only 50 mm water the gas residence times were below 0.5 sec. This is due to the extraordinary effectiveness of the magnesia-manganese oxide mixture which requires much shorter residence times than a pure magnesia oxide suspension. The coke filter of earlier experiments was replaced by a lamellar droplet separator. The original throughput of fresh absorption mass of 1.6 to 1.8 g/g SO2 could be reduced to less than 1.5 g mass/g SO2. The absorption of SO3 at temperatures of about 350 C is almost total and that of fluorine is 70%.

21178 APTIC NO. 40712

Haenig, Gernot and Klaus Husmann

THE GRILLO-AGS PROCEDURE APPLIED FOR WASTE GAS DESULFURIZATION. *(Das Grillo-AGS-Verfahren zur Entschwefelung von Abgasen). Text in German. Erzmetall, 25(4):175-181, 1972. 13 refs.*

The Grillo-AGS wet absorption procedure, developed for the removal of sulfur oxides from waste gases in 1969, as well as related pilot plant experiments, realized equipments, and possible uses are described. The absorbent, formed by mixtures or compounds of magnesium and manganese oxides, is sprayed into the path of the waste gas flow in a reactor, and after being recirculated several times, the spent suspension is removed for drying. The dried matter, containing 17 to 21% of sulfur in the form of magnesium sulfate or sulfite, is then subjected to thermal regeneration in a separate, central roasting furnace, by adding a reducing agent such as oil, natural gas, sulfur, or coal. The roasting gas formed contains 5-7% of the sulfur dioxide by volume, and can be reprocessed to sulfuric acid in conventional equipment. A pilot plant, designed for an oil-fired steam boiler, was composed of a 5 m long tube of 0.8 m diameter. It had an efficiency of above 90% at a capacity of 27,500 cu m/hr, while the sulfur dioxide and sulfur trioxide concentrations in the waste gas were 1.3-2.5 g/cu m and 50-300 mg/cu m, respectively. The separation of the suspension from the waste gas was made in a tower, followed by a lamellar droplet separator with an over-all efficiency of 99.5%. The contact time was less than 0.5 sec, and the specific expenditure lay at 1.5 g/g of SO2. Rapid hydratation of the absorbent below pH 7 was observed. The SO3 removal at 350 C was nearly quantitative, and the efficiency for fluorine was 70%. Full-size industrial equipment have efficiencies of 30-95%, and several units are preferably connected to a central, separate regenerator. The total costs of the SO2 absorption at an oil fired power plant lie in a range of .04-.07 cents/kWh (1.9 million cu m/hr, 3.5 g of SO2 per cu m). The Grillo-AGS procedure can be applied to thermal power plants, remote heating plants, and metallurgic plants. Large regenerator plants with a capacity of 200,000 tons of sulfuric acid should be designed.

21179 APTIC NO. 39945

Hannaman, J. R. and A. J. Etingen

HERE S A WORKABLE, SMOKELESS FLARE SYSTEM. *Petrol. Process., 11(3):66-69, March 1956.*

A modern relief and blowdown flare system was recently installed to serve a 14,000 b/d platformer-unifiner, and unisol and sulfur plants, at a west coast oil refinery. All relief headers from the process units combine into a common 24-inch header which deposits the hydrocarbon gases and liquids into a 10 by 30 foot knockout drum. Liquids accumulating in the drum are pumped from the drain pot through a slops cooler to a 15,000-bbl floating roof tank. The hydrocarbon gases can leave the knockout drum in two ways. Blows smaller than an equivalent flow of 60,000 lbs/hr of propane flow through a 10-inch line to a smokeless flare stack and are ignited by constantly burning pilots at the tip of the stack. Steam is proportioned to the stack for smokeless burning of the gases through a control valve set by a pressure-indicating controller actuated by back pressure of the gases to the stack. For large blows, the water seal blows and the gases are dumped to a flare pit where they are ignited by constant burning pilots on the outlet of the pit pipe. Equipment for smokeless burning was not deemed necessary at this outlet. Design, operational, and alarm features, and operating experience are described.

21180 APTIC NO. 40131

Hardison, Leslie C.

CATALYTIC OXIDATION OF WASTE GAS STREAMS WITH FLUIDIZABLE SUBDIVIDED PARTICLES. *(Universal Oil Products Co., Des Plaines, Ill.) U. S. Pat. 3,632,304. 6p., Jan. 4, 1972. 6 refs. (Appl. Sept. 3, 1968, 7 claims).*

A method and means for effecting the continuous catalytic oxidation of a waste gas stream in a reactor stack unit by the use of light weight subdivided catalyst particles which can be fluidized and carried with the gas stream through a reaction zone and then separated and returned for reuse at the inlet end of the reaction zone is discussed. The system is suited for treating any gaseous waste gas stream which can be purified by oxidation in the presence of air. Differential pressure is measured at vertically spaced points within the reactor zone, providing for variations in the amount of catalyst maintained within the reaction zone and the flow rate. Oxygen for fuel is supplied entirely as secondary air from the waste gas stream. Directional vanes are provided in the upper portion of the reactor section whereby catalyst particles are centrifugally thrown to the outer portion of the gas-particle separating outlet section for subsequent descending flow.

21181 APTIC NO. 40405

Hardison, Leslie C.

PROCESS FOR DECONTAMINATING A FLUE GAS SYSTEM. *(Universal Oil Products, Des Plaines, Ill.) U. S. Pat. 3,632,305. 7p., Jan. 4, 1968. 8 refs. (Appl. Dec. 16, 1968, 11 claims).*

This patent describes a method of reducing the fly ash and sulfur dioxide content of a flue gas stream by passing the flue gas through a mobile-packing scrubber to effect collection of the bulk of fly ash, then through subsequent scrubbers in which the flue gas is washed with a liquid containing an oxygen compound of magnesium or calcium. The sulfur dioxide in the flue gas stream reacts with these compounds and the resulting liquids and solids are carried to a kiln where the reaction products are decomposed. The sulfur dioxide is driven off, and the magnesium or calcium compounds are regenerated for partial reuse. This process is designed to reduce the commercial air pollution from sulfur dioxide, fly ash, and other particles in a flue gas stream at a commercially attractive cost and to minimize corrosion of equipment. Sulfuric acid is produced as a by-product. Inexpensive common materials such as limestone, magnesium oxide, and calcium oxide can be used to effect chemical reaction of the sulfur dioxide.

21182 APTIC NO. 40073

Harkins, W. D. and R. E. Swain

PAPERS ON SMELTER SMOKE. (FIRST PAPER). THE DETERMINATION OF ARSENIC AND OTHER SOLID CONSTITUENTS OF SMELTER SMOKE, WITH A STUDY OF THE EFFECTS OF HIGH STACKS AND LARGE CONDENSING FLUES. *J. Am. Chem. Soc., 29(7):970-998, July 1907. 15 refs.*

The amount of arsenic expelled from the greatest of the world s smelters--a plant which has a capacity of ten thousand tons of ore per day, and the output of which for 1906 was estimated as eleven and one half per cent of the world s production of copper--was estimated. The smoke and the grasses of the district were found to contain considerable arsenic, while small quantities of this element were found in the organs of herbivorous animals living in the vicinity of the smelter. As a result of the operation of the new smelter, the losses of stock in the valley during the year 1902 were so heavy, and the hay and grass, on analysis, showed so much arsenic, that a great system of flues was built in order to settle the copper and to condense the arsenci trioxide. Velocity determinations, measurement of temperature, velocity measurements for smoke samples, and the collection and determination of the total weight of the solids were undertaken to ascertain the efficiency of the flues and stack. General effects of the high stack are indicated, and measurement methods are discussed in detail.

21183 APTIC NO. 40072

Harley, M. A. E.

HOW TO COPE WITH YOUR GAS FILTRATION PROBLEM. *Process Eng. Plant Control, 1971:22, 23, 25, 26, Jan. 15, 1971.*

Irrespective of the application, gas or air filtration equipment can be divided into two types: dust collectors and air or gas filters. The difference between them is not so much the quality of the effluent gas but rather the dust burden. Where dust burdens are high, as in many of the processing industries, the dust collector is used. Where dust burdens are low the air filter is used. Dust collectors can again be subdivided into four basic types: cyclone, wet, fabric, and electrostatic. Cyclones, venturi scrubbers, fabric filters, fabrics, bag cleaning systems, electrostatic precipitators, and air filters are described, including their advantages, disadvantages, and operating principles.

21184 APTIC NO. 40251

Hartig, Rufus G.

METHODS FOR PREVENTION OF SURFACE WATER CONTAMINATION AND AIR POLLUTION BY FLUORINE COMPOUNDS FROM PHOSPHATE PLANTS. *(Assignee not given.) U. S. Pat. 3,642,438. 12p., Feb. 15, 1972. 9 refs. (Appl. April 15, 1969, 5 claims).*

A process is described for the elimination of the fluorine contamination of surface waters and other pollution by fluorine compounds from phosphate plants, and for recovery of fluorine as hydrofluosilicic acid. The processes involve the separation of fluorine compounds from waste gases by absorption-desorption with sodium fluoride, barium difluoride, or potassium fluoride, and absorption of silicon tetrafluoride in water. Hydrofluoric acid may also be recovered in the process. A principle object of the invention is the control of fluorine content of gypsum pond waters. Scrubbers, filters, and settling tanks are part of the process.

21185 APTIC NO. 40114

Hartsuch, Paul J.

PAPER INDUSTRY IMPROVING THE ENVIRONMENT. *Graphic Arts Monthly, 43(5):48-51, May 1971.*

In the papermaking process, only about half the weight of the original wood becomes saleable paper, while disposal of the residual bark, clay, wood sugars, starches, and other materials creates severe air and water pollution. Pulp-making operations and not the paper mills are responsible for almost all the air pollution caused by the paper industry, paper mill stack plumes are almost completely water vapor, while pulp mills produce solid and gaseous effluents, including odorous sulfur compounds. Electrostatic precipitators, scrubbers, and other types of equipment are being installed in kraft mills to collect particulates, and low-odor recovery boilers are contributing to reduced hydrogen sulfide emissions. The scope and costs of industry water and air pollution research and control programs are reviewed, particularly for the recycling of consumer-produced waste paper, part of an overall forest conservation program0 that also includes reforestation, fire control, and disease and pest control. Systems for recovering paper pulp from solid wastes and from process by-products such as sawdust are being investigated.

21186 APTIC NO. 40682

Hata, Yotaro

ENGINE EXHAUST GAS TREATMENT DEVICE. *(Enjin haiki gasu shori sochi). Text in Japanese. (Matsushita Seiko K. K., Osaka (Japan)) Japan. Pat. Sho 47-2966. 2p., Feb. 1. 1972. (Appl. July 7, 1969, 1 claim).*

A filtering device for a motor engine exhaust gas is presented. The device comprises a case containing a water tank at the lower end and an exhaust exit at the upper end, with a layer of filtering medium such as sand in the middle. Above the filter is a pipe with spray nozzles. The pipe runs outside the case, circulating the water from the tank by a pump. The spray prevents clogging of the filter layer, and the water from the tank is filtered through before circulating back to the spray nozzle. The exhaust pipe from the engine opens into the space above the water and the filter layer. Exhaust from the motor enters from the pipe and the air pressure forces it through the filter layer. The soot and dust in the exhaust gas are eliminated in the layer and washed down by the water from the nozzles. The clean air goes out from the top exit where a fan is attached.

21187 APTIC NO. 40084

Hazleton, Jared E.

SOURCES OF SUPPLY OF SULPHUR. *In: The Economics of the Sulphur Industry. Washington, D. C., Resources for the Future, Inc., 1970, Chapt. 2, p. 11-33. 38 refs.*

Mining by the Frasch process and by-product recovery are the two major sources of sulfur. The Frasch process is described and the historical development of the Frasch sulfur industry in the U. S. and Mexico, including offshore mining, is traced in detail. When the practice of removing hydrogen sulfide from natural and manufactured gases began late in the 19th century, the hydrogen sulfide was either vented to the atmosphere or burned. With the appearance of anti-pollution and conservation laws and the increasing use of gases with high H2S concentrations, it became necessary to convert the H2S into either elemental sulfur or sulfuric acid. The shortage of sulfur in the early 1950s provided an economic incentive to accelerated sulfur recovery from acid gas streams, and since 1954, sour natural and refinery gases have become a major source of sulfur. The Claus-Chance conversion process, the most widely used at present, is described, and the production of recovered sulfur in the U. S., Canada, France, and the Middle East is reviewed. Because air pollution legislation and the demand for desulfurized products are major factors encouraging sulfur recovering at oil refineries, California, with its stringent regulations, accounts for over 24% of total U. S. capacity for sulfur recovery from refineries. Recovered sulfur accounts for about 25% of total world sulfur production (excluding Communist nations); this share is expected to increase.

21188 APTIC NO. 40462

Hermann, Joerg and Wolfgang Herzog

BASIC PROCESSES AT THE FORMATION OF DUST MASS FLOW DENSITY PROFILES. *(Grundvorgaenge bei der Ausbildung von Staubmassenstromdichteprofilen). Text in German. Staub, Reinhaltung Luft, 32(5):198-202, May 1972. 15 refs.*

The free fall of dust in pipes was studied to explain the formation of mass flow density profiles and of segregations in dust-laden gas flows. Three steel pipes with diameters of 411, 253 and 107 mm and a length of 3.3 m were set up in a vertical position. The mass flows were varied from 5 to 300 g/min. Glass dust was used for the experiments. The mass flow is not uniformly distributed over the tube cross section. Marked dust mass density profiles developed whose shape depended on the tube diameter, the type of dust (grain size, shape, and density), the dust mass flow, and the falling height. With coarse dusts, low mass flow, and low falling height, a pronounced maximum was found in the center of the tube with the profile approaching zero in the direction of the wall. With fine dusts, large mass flows, and a large falling height, the profile shows an absolute minimum in the center of the tube with the mass flow steadily rising in direction of the wall. These phenomena are due to the forces which act on the dust particles such as the forces of gravity, buoyancy, inertia, resistance, impaction, and electric forces.

21189 APTIC NO. 40196

Howell, G. A.

AIR POLLUTION CONTROL IN STEEL INDUSTRY. *Iron Steel Engr., 30(10):91-94, Oct. 1953.*

Progress made by a committee of steel companies, established under the provisions of the Allegheny County (including Pittsburgh), Pa. Smoke Control Ordinance, in investigating methods to control air pollution from steelmaking operations is reviewed. The results of measurements of dust loadings, particle size, and iron oxide content from open hearth emissions are given. The use of electric precipitators and high-energy requirement dust washers for control of the large percentage of fume present in the stack gases from an oil-fired open hearth is discussed. There does not appear to be a solution at present to emissions from Bessemer converters. However, methods for cleaning blast furnace gas are well established and usually consist of three stages: cylcones for the large particles, low-energy requirement wet washers for the next smaller sizes, and electric precipitators or high-energy wet washers for the smallest particles. Specific types and combinations of cleaners are noted, and problems from blast furnace slips and furnaces producing ferromanganese are considered. The voluntary self policing program developed by the Allegheny County steel industry for smoke control is described.

21190 APTIC NO. 39806

Ingels, Ray M., Norman R. Shaffer, and John A. Danielson

CONTROL OF ASPHALTIC CONCRETE PLANTS IN LOS ANGELES COUNTY. *J. Air Pollution Control Assoc., 10(1):29-33, Feb. 1960. 6 refs. (Presented at the Air Pollution Control Association, Annual Meeting, 52nd, Los Angeles, Calif., June 21-26, 1959.)*

In 1949 a rule was promulgated limiting dust emissions from asphaltic concrete plants in Los Angeles County to 40 lbs/hr. The types of equipment installed in response to this regulation are reviewed, and collector efficiency data from stack testing are given. Multiple centrifugal scrubbers have proved more efficient than baffled towers. The ratio of scrubber water to gas is equally important in both types, with an optimum ratio of 6 gal/1000 scf for the best use of water. Scrubber stack emissions increase linearly with an increased amount of minus 200-mesh material charged to the dryer. The burning of PS 300 or heavier fuel oils rather than natural gas results in an increase of stack emissions by about 5 lbs/hr under constant conditions. It appears that dust emissions decrease significantly with PS 200 oil. The use of scrubbers has reduced asphaltic concrete plant emissions from 25 tons/day to 1 ton/day. If this is related to the increase in production over the 10-year period evaluated, then the control program has removed a net quantity of 34 tons/day of dust from the Los Angeles atmosphere. (Author conclusions modified)

21191 APTIC NO. 40204

Jaffe, Theodore

ODOR CONTROL IN SEWAGE TREATMENT. *Water Sewage Works, vol. 104:175-178, April 1957. 6 refs.*

Problems related to odor control in sewage treatment often include public relations difficulties, damage to structures, danger to persons, poor efficiency, personnel problems in the plant, and legal action. Probably the most destructive of the gases that may be produced from sewage is hydrogen sulfide. With the assistance of sewage bacteria, the sulfur unites with water and oxygen to form sulfuric acid and attacks concrete. Hydrogen sulfide also discolors painted tanks and buildings, and is lethal to humans at low concentrtions, e.g., 0.1% by volume for 30 min. Obnoxious odors around a treatment plant cause inefficiency and personnel problems. Such odors may arise from septic sewage, industrial wastes, plant operation, design problems, and so-called normal odors. Control methods include good housekeeping and good operation; segregation or pretreatment of obnoxius industrial wastes; mechanical methods such as ventilating or exhausting devices, scrubbers, or heat treatment; and chemical methods, comprising two types: masking agents and counteractants. Masking agents are a form of temporary treatment and are only effective as long as they are in use. Counteractants attack the odors and by chemical means seek to change obnoxious odors into something that is not unpleasant.

21192 APTIC NO. 40484

Jo, Ekikyo

NEW ALLOYS AS CLEANING CATALYSTS FOR AUTOMOTIVE EXHAUST GAS. *(Jidosha haiki no seijo shokubai to shinkinzoku). Text in Japanese. Kinzoku (Metals) (Tokyo), 41(12):54-56, Dec. 1971.*

The most effective oxidation catalysts for automotive exhaust gas are noble metals. Among them, platinum is the best. The catalytic activity of Pt increases significantly from about 300 C, and reaches saturation soon after this temperature. The activity was retained up to 800 C without the catalyst being destroyed. Generally, the light on temperatures for metal catalysts are not clear-cut, and the temperature ranges are wide between light on and saturation. Due to the successful development of a honey comb type supporter, the required amount of Pt per automobile has been minimized to 1 to 2 g. This supporter can also eliminate the problem of friction loss of the catalyst which generates and discharges particulates into air. Mixtures of metal oxides were also used as the oxidation catalyst. However, the compositions are usually not available because of the industrial secret policies. The metal oxide catalyst can be used without a supporter, therefore the friction loss does not cause the decrease of activity.

21193 APTIC NO. 40774

Johnstone, H. F.

TECHNICAL ASPECTS OF THE LOS ANGELES SMOG PROBLEM. *J. Ind. Hyg. Toxicol., 30(6):358-369, Nov. 1948. 34 refs.*

Public sentiment and improved standards of living demand that excessive pollution of the atmosphere be prohibited in areas of dense population. The Los Angeles smog problem results from the topographic and meteorologic feature of the area which control the escape of industrial and domestic pollution. Elimination of the nuisance will require more rigorous standards than those in other cities where the wind and normal atmospheric turbulence rapidly diffuse the contaminants. Although exact information on the nature of the smog is still lacking, certain aspects of the problem are related to the general properties of aerosols. It is estimated that the non-hygroscopic, non-volatile particles are approximately the size of the wavelength of light and exist at concentrations of about 0.1 mg/cu m. Contributions of sulfur compounds to smog and eye irritation are discussed, and methods for eliminating them are reviewed. New developments in the equipment for the control of dust and fumes are described, and sampling methods are considered. (Author summary modified)

21194 APTIC NO. 40456

Kaellstrand, G. and W. Kurt

STATE OF THE ART AND TENDENCIES OF DEVELOPMENT IN SWEDISH BOILER CONSTRUCTION. *(Stand und Entwicklungstendenzen des Kesselbaues in Schweden). Text in German. Mitt. Ver. Grosskesselbetr., 52(2):109-118, April 1972. (Presented at the VGB Sondertagung, Skandinavien 1971, Stockholm, Sweden, March 24, 1971.)*

Swedish boilers are increasingly operated with a view to protecting the environment. A first step in this direction was the operation with a low air surplus which reduces sulfur trioxide and oxides of nitrogen. In order to prevent sulfur dioxide emission, the sulfur content in the fuel may be 2.5% at the most. Two experimental flue-gas desulfurization plants (Bahco) are being tested in boilers with a capacity of 20 tons of steam/hr. Another method which is being studied is the recirculation of combustion gases into the secondary air and the two-step combustion process.

21195 APTIC NO. 40630

Kaiser, Erwin

STUDYING THE RELATIONSHIP BETWEEN SOLID AND GASEOUS INCOMPLETE BURNING-RESULTED MATTER IN DIESEL ENGINE EXHAUST. *(Untersuchung des Abhaengigkeitsgrades zwischen festem und gasfoermigem unvollkommen Verbranatem in Dieselmotorabgasen). Text in German. Wiss. Z. Tech. Univ., Dresden, 20(2):511-518, 1971. 36 refs. (Presented at the International Symposium on Combustion Processes, 2nd, Warsaw, Poland, Oct. 14, 1970.)*

Studies of the relationship between soot, carbon monoxide, and total hydrocarbons in the exhaust of a standard Diesel engine are described. The gravimetric soot measurements were carried out by means of glass-fiber paper, and a flame-ionization detector was used for the determination of total hydrocarbons The carbon monoxide concentrations, determined by means of the gas chromatograph, lay in a range of 80-500 ppm. The carbon monoxide, total hydrocarbons, and soot concentrations were independent of the speed of rotation in the investigated range of 600-1250 rpm. The beginning of the injection strongly influenced the soot, total HC, and CO concentrations, and delayed injections resulted in incomplete combustion. The optimum injection time, required for maximum engine output, resulted in minimum concentrations. All concentrations, except for that of the nitrogen oxides, decreased with increased cooling water temperature. The injection pressure had minor influence on the concentrations, but this influence may be important in the case of direct injection. The CO to soot ratio (0.972 kmol C/kmol C) was fairly constant with a fuel to air ratio of 0.0427-0.0548, excess-air coefficients of 1.27 to 1.63, at 70 C cooling water temperature, with an optimum injection time 4.8 C before top dead center, and in an injection pressure range of 70-120 kg/sq cm. The smoke threshold was found within the above range. Both low CO and total HC concentrations in Diesel engine exhausts were found to characterize the soot concentration. Gravimetric soot measurements as well as smoke tests should be completed with carbon monoxide measurements.

21196 APTIC NO. 40604

Kanter, Carl V. and Ivan S. Deckert

CONTROL OF AIR POLLUTION FROM OIL REFINERIES IN LOS ANGELES COUNTY. *Air Repair, 4(4):197-202, 212, Feb. 1955. 10 refs.*

Air pollution problems and control measures of the oil industry in Los Angeles County are reviewed. Oil refinery emissions include smoke, dust, malodors, sulfur compounds, oil mists, and hydrocarbon vapors; the latter play a significant role in smog formation. Storage of petroleum products is one important source of hydrocarbon emission; three methods used to reduce evaporation losses from storage tanks are a floating roof, variable volume vapor space, and vapor recovery. Controls for hydrocarbon emissions from effuent water systems include improved separator boxes with suction line and compressor, floating roof covers with automatic skimming devices, or reduction of drippage from pumps by use of mechanical seals instead of conventional packing. Flares are used to dispose of hydrocarbon gases and vapors occasionally released to the atmosphere due to abnormal operation. Refineries in Los Angeles County have installed two types of smokeless flares using venturi burners or steam injection into the combustion zone. Equipment for preventing emissions from vacuum jets include a condenser, a closed settler for separating water and hydrocarbons, and fume incineration. Some design and operation modifications and maintenance techniques to prevent hydrocarbon emissions from minor sources are considered. Control methods to reduce pollutant concentrations from crude oil processing, cracking units, and other oil refinery processes include scrubbing and conversion of hydrogen sulfide to elemental sulfur or sulfuric acid as by-product recovery; fume burners to control mercaptans; electrical precipitators, wet-type dust collectors, or cyclones for dust removal; proper combustion equipment to control smokes; and burning malodorous vapors and gases in a combustion chamber or fire box.

21197 APTIC NO. 40425

Kast, W. and F. Jokisch

SHAPES OF SORPTION ISOTHERMS AND SORPTION KINETICS ON POROUS SOLIDS. *(Ueberlegungen zum Verlauf von Sorptionsisothermen und zur Sorptionskinetik an poroesen Feststoffen). Text in German. Chem. Ing. Tech., 44(8):556-563, April 1972. 8 refs. (Presented at the Verfahrens-Ingenieure, Annual Meeting, Nuremberg, West Germany, Sept. 21-23, 1971.)*

The equilibrium between a vapor in the proximity of an adsorbent and the bound phase of the vapor can also be described thermodynamically for adsorption. The most important quantity concerned is the binding energy. Adsorption and desorption are initiated by a deviation from thermodynamic equilibrium. The driving potential of these processes is therefore regarded as the chemical potential, which, on assumption of ideal behavior of the vapor, can be attributed to the vapor pressure or the relative humidity. Within certain limitations with regard to the shape of the sorption isotherms, a differential equation can be derived for the sorption kinetics. The concentration-dependent diffusion coefficient was compounded formally from transport in the gas phase or molecular motions in the pores and transport in the sorbed state. Measurements of the changing load of the porous adsorbents were carried out for determination of the magnitude of the real diffusion coefficient. Recording analytical scales were used for the measurements. The spherical samples were exposed to an air flow with constant water vapor concentration. No detailed results are yet available. It has become apparent, however, that the diffusion coefficient is related to the loading of the adsorbent in a rather complicated way. The importance of adsorption methods in the fields of air and water pollution is stressed.

21198 APTIC NO. 40404

Kato, Jun

DESULFURIZATION FOR POLLUTION PREVENTION. *(Kogai boshi no tame no datsuryu ni tsuite.) Text in Japanese. Koatsu gasu (High Pressure Gas Eng.), 8(3):164-167, 1971.*

The processes of desulfurization which remove sulfur dioxide from exhaust gas and sulfur from heavy oil by means of hydrogenation are described. A cross flow-absorption method was developed by using caustic soda, potassium bisulfite, or the slurry of magnisium oxide and sodium carbonate as an absorbent. An activated manganese oxide method has also been developed in which granular MnO was used to react with SO2 to form manganese, and after water was added, this was led into oxidation tower where ammonia and air were added to recover the absorbent and produce ammonium sulfate. A large plant of the latter type of 110 MW is planned. A plant of 150 MW using the activated carbon method is also planned. Two types of hydrogenation-desulfurization have been widely used, the indirect desulfurization of light oil and oil distillate, and the direct desulfurization of residue oil. The life of the catalyst in the indirect method usually lasts for 2 to 4 yrs due to a small amount poisonous substance contamination of the oils. The sulfur component could be decreased to 0.3-0.5 wt %. The catalyst s life in the direct method could last only 1/2 to 1 yr due to the large amount of poisonous substances such as nickel, vanadium, and asphalt in the oil.

21199 APTIC NO. 40285

Keilen, B. and A. L. Walitt

DEVELOPMENT OF THE CATALYTIC CHAMBER PROCESS FOR THE MANUFACTURE OF SULFURIC AND NITRIC ACIDS FROM WASTE FLUE GASES. (FINAL REPORT). *Tyco Labs., Inc., Waltham, Mass., Office of Air Programs Contract PH 86-68-75, Rept. APTD-0962, 183p., 1969. 18 refs.*

NTIS: PB 209191

A process based on the lead chamber process for sulfuric acid manufacture has been developed for the simultaneous removal of sulfur dioxide and nitrogen oxides from power plant flue gas at normal stack gas effluent temperatures. Sulfur dioxide removal is accomplished by oxidation with nitrogen dioxide followed by absorption of the resulting sulfuric acid and the oxides of nitrogen in a recycle stream of sulfuric acid. The acid is stripped of its nitrogen oxide content and is recirculated to the absorber after the product acid is withdrawn. The nitrogen oxides are reoxidized with the excess nitrogen dioxide being converted to nitric acid and the bulk of the oxide recycled for further sulfur dioxide oxidation. Thus the nitrogen dioxide acts as a reactive catalyst. The two major modifications to the original Chamber Process which make this new method technologically and economically feasible are: a high temperature isothermal scrubber which permits the scrubber to recover the sulfuric acid and the oxides of nitrogen without absorbing any diluent water (which would require heat to remove), and a catalytic stripper by which the oxides of nitrogen in the scrubber effluent acid are rapidly oxidized in the liquid phase, thus avoiding the vapor pressure limitations of recovering a dissolved gas from solution and thereby elimination the need for extra heat. Experimental confirmation on a limited laboratory scale was obtained for the two vital parts of the new Catalytic Chamber Process: high temperature absorption of sulfuric acid and nitrogen oxides in sulfuric acid, and catalytic oxidation of nitrogen oxide solutions in sulfuric acid solution to NO_2 using activated charcoal as the catalyst. A preliminary economic analysis based on an 800 megawatt plant showed that an add-on Catalytic Chamber Process clean-up plant would cost about $11.3 million in capital costs and about $3.7 million per year in operating costs before taking a credit for acid by-products. (Author summary modified)

21200 APTIC NO. 39935

Kemmetmuller, Roland

ECONOMY IN PLANNING AND DESIGNING OF BOF WASTE GAS-COOLING AND DUST-COLLECTING PLANTS. *Iron Steel Engr., 41(9):203-217, Sept. 1964.*

The steelmaking process of blowing pure oxygen into the converter requires quite an array of auxiliary equipment. This equipment considerably influences the entire construction, as well as the initial investment and operating cost. Of particular influence on the costs are the cooling and dust-collecting equipment. Basically, there are, at present, three different systems in use for the cooling of and dust removal from waste gas of the converter: high excess of air for cooling the gas; controlled combustion of the gases in waste heat boilers; exhausting of the converter waste gases with prevention of their combustion. A comparison is presented of the costs of three furnace shops each with 150-ton furnaces, which indicates that a reduction of costs can be achieved with gas cooling and dust collecting equipment for two or three oxygen furnaces.

21201 APTIC NO. 40726

Klimisch, Richard L. and Gerald J. Barnes

CHEMISTRY OF CATALYTIC NITROGEN OXIDE REDUCTION IN AUTOMOTIVE EXHAUST GAS. *Environ. Sci. Technol., 6(6):543-548, June 1972. 15 refs.*

The catalytic control of nitrogen oxide emissions in automobile exhaust was investigated in laboratory and engine dynamometer tests. A typical base-metal catalyst, an alumina-supported mixture of copper and chromium oxides, was used in all tests. The chemical reactions that control product formation during the reduction of nitrogen oxides over this catalyst were identified. The catalyst first equilibrated the exhaust gases with respect to the water gas equilibrium. This changed the dominant reducing species in the exhaust gases from carbon monoxide to hydrogen. The H_2 so formed was effective in promoting the conversion of nitric oxide to ammonia, especially at temperature less than 375 C. The air-fuel ratio also affected ammonia formation. At temperatures greater than 600 C the lesser amounts of NH_3 produced were shown to be due to the elemental decomposition of NH_3. (Author abstract modified)

21202 APTIC NO. 40079

Kopita, Robert

THE USE OF AN IMPINGEMENT BAFFLE SCRUBBER IN GAS CLEANING AND ABSORPTION. *Air Repair, 4(4):219-222, 232, Feb. 1955.*

The impingement theory of wet gas cleaning is discussed, including its application in a specific type of perforated impingement baffle plate scrubber. For a properly designed impingement scrubber, the following factors should be incorporated: subdivision of the gas into many small streams; directed impingement of the gas stream against a wetted target; and close contact between gas and liquid. The impingement baffle plate employs all of these factors for maximum efficiency and flexibility of operation. Applications to lime kilns, pyrite roasters, blast furnaces, pulverized coal, carbon black, and hydrogen sulfide are described. (Author summary modified)

21203 APTIC NO. 40187

Korenenskaya, F. V., L. M. Pershina, and A. Yu. Rozovskii

CHEMISORPTION OF CARBON MONOXIDE ON ZINC OXIDE. *Kinetics Catalysis (USSR) (English translation from Russian of: Kinetika i Kataliz), 12(5):1211-1212, May 1972.*

The adsorption of carbon monoxide on zinc oxide in the temperature range from 196 C to 400 C was studied. The adsorption, which is considerable at low temperatures, becomes very small at room temperature, and then rises with an increase of the temperature to 400 C. At temperatures above room temperature, chemisorption takes place partially, with the formation of a strong bond with the surface of the zinc oxide. The amount of strongly bound carbon monoxide is characterized by the difference between two consecutive measurements of the adsorption isotherms, with intermediate evacuation, at the adsorption temperature. With the high-temperature aging of the samples, the adsorption isotherms are reproduced; the amount of chemisorbed carbon monoxide depends on the aging temperature, although the specific surface of the samples remains constant.

21204 APTIC NO. 40252

Kovach, Stephen M. and Ralph E. Patrick

PROCESS FOR DESULFURIZATION OF AROMATICS. *(Ashland Oil and Refining Co., Inc., Houston, Tex.) U. S. Pat. 3,642,927. 5p., Feb. 15, 1972. 13 refs. (Appl. Feb. 7, 1968, 18 claims).*

The sulfur contained in aromatic hydrocarbons, particularly in the form of thiophenes, is substantially removed by treating the hydrocarbons with metals, and oxides of those metals having hydrogenating activity. In one form of the process, the aromatic hydrocarbon is contacted with nickel, cobalt, nickel and tungsten, cobalt and tungsten, or their oxides at a temperature of about 200 to 600 F and a pressure of about 50 to 500 psig. In another form, the aromatic hydrocarbon is contacted with nickel, cobalt, nickel and molybdenum, cobalt and molybdenum, nickel and tungsten, cobalt and tungsten, or their oxides at a temperature of about 600 to 900 F and a pressure of about 0 to 50 psig. This treatment is more economical than previous desulfurization processes.

21205 APTIC NO. 40018

Kuechler, William L. and Lyle E. McCoy.

APPARATUS AND METHOD THERMAL REGENERATIVE GAS PROCESSING. *(Proctor and Schwartz, Inc., Philadelphia, Pa.) U. S. Pat. 3,634,026. 10p., Jan. 11, 1972. 10 refs. (Appl. July 25, 1969, 12 claims).*

An integrated incinerator and heat exchanger unit of modular construction capable in conjuction with other units or alone of efficiently removing pollutents carried by the exhasut gas flow of an industrial system. The unit comprises a boxlike enclosure having a series of internal flues each containing a static, heat exchange, packed bed of particulate material and being in flow communication with the other flues of a unit through a common chamber, the chamber including one or more burners for heating the beds, each unit having a common inlet duct and a common outlet duct with control means therein to permit predetermined entry and exit of flow into and out of respective flues, the unit being capable of burning out trapped solids in the heated beds by means of temporary isolation of their respective flues, and the unit including a self-limiting ambient air entry for each flue to purge its bed and improve incineration efficiency. (Author abstract)

21206 APTIC NO. 40210

Kuila, J.

TRIALS ON BLOWING CONVERTER DUST INTO THE STEELMAKING CONVERTER AT THE VSZ (EAST SLOVAKIAN IRONWORKS) PLANT AT KOSICE. *Hutnik (Prague), 19(12):461-463, 1969. 1 ref. Translated from Czech. British Iron and Steel Industry Translation Service, London (England), 7p., Sept. 1970.*

Uses for flue dust formed in oxygen steel making and collected to reduce air pollution are examined. The dust contains high levels of iron (about 75% Fe_2O_3) and recycling to recover the iron is attractive economically. One method of recycling is to blow the recovered dust into the steel converter through the oxygen lance. The process is feasible but is not suitable from the processing and economics viewpoints. Steel yields and quality are lower and lime consumption and nitrogen content are increased. In addition, the dust conveying equipment is complicated and requires skilled maintenance operators. Parallel test with charging pellitized convertor dust indicated that pellets are economically more advantageous.

21207 APTIC NO. 40402

Kunstein, E.

A NEW PROCEDURE FOR ODOR ABATEMENT. *(Ein neues Verfahren zur Geruchsverminderung). Text in German. Luftverunreinigung, 1971:25-27, Dec. 1971. 3 refs.*

A new air cleaning procedure, applied to organic aerosol in the synthetic resin shop of a mineral fiber processing plant, is described. The aerosol, produced at a rate of 100,000 cu m/hr, contained 330 mg of organic matter/N cu m, with maximum phenol and formaldehyde concentrations of about 250 and 50 mg/N cu m, respectively. Since ozonization proved not to be suitable, wet tubular electrostatic filters were applied. The air was cooled down below dew point before treatment. The filter, with a capacity of 30,000 cu m/hr, contained 144 tubes, and had a flow area of 7.9 sq m with 3000 mm length and a total active surface of 360 sq m. The air, admitted at a speed of 1.05 m/sec, required 3 sec to pass through the tubes. The efficiency, with a maximum of 70.4%, increased with increased concentration. The respective efficiencies for phenol and formaldehyde were a maximum of 54.6% and 43.0%, respectively. The cleaned air, almost odorless, contained mainly gaseous monomers.

21208 APTIC NO. 40403

Kunstein, E.

CONTRIBUTION TO THE WASTE GAS DESTRUCTION PROBLEM IN PETROLEUM REFINING AND PROCESSING PLANTS BY MEANS OF HIGH TORCH FLARES. *(Zur Problematik der Abgasvernichtung durch Hochfackeln in Raffinerien und petrochemischen Werken). Text in German. Luftverunreinigung, 1971:27-28, Dec. 1971. 5 refs.*

High torch flares, used too frequently in petroleum refining and processing plants, emit great amounts of soot and other pollutants due to the incomplete combustion. To reduce such emissions, strict measures have been introduced in North Rhine-Westphalia. Refineries to be built will be required to use high torch flares only during major breakdowns such as power failures, while existing plants must not use such torches for the burning of steady currents or during minor breakdowns, starting-up, and stopping periods. Instead, such products should be recycled or used for fuel, while the destruction in special chambers, so-called ground torches, is preferred. Ground torches, though not economical, are needed very often, and operate satisfactorily with regard to air pollution. High torch flares should then serve as emergency devices only.

21209 APTIC NO. 40495

Kuznetsov, I. Ye., A. I. Luk yanitsa, V. N. Yefremov, G. A. Chumakov, R. Yu. Morin, and V. D. Garmash

A PILOT PLANT FOR WASTE GAS CLEANING TO BE APPLIED IN AMMONIUM NITRATE MANUFACTURING PLANTS. *(Sanitarnaya ochistka otkhodyashchikh gazov na pilotnoy ustanovke v proizvodstve nitrita ammoniya). Text in Russian. Khim. Khim. Tekhnol., 15(2):255-259, 1972. 2 refs.*

A procedure for the absorption of nitrogen oxides was tested at an ammonium nitrite production pilot plant. The nitrogen oxides concentration in waste gases from such plants is 0.18-0.20%, while the oxidation degree of the nitric oxide is usually below 20%. Laboratory tests showed that the oxidation and the subsequent absorption of the nitric oxide can be effective with hydrogen peroxide with an ammonium carbonate addition. The pilot plant tests were carried out on a three-stage absorber unit at a gas flow rate of 76 cu m/hr, a solution expenditure of 20 l/hr (300 g of ammonium carbonate/l), and a spray density of 1.6 cu m/sq m hr. The foam thickness was 150 mm. The nitrogen oxides concentration decreased from 0.213 to 0.075%, corresponding to an efficiency of 64.8%. The optimum conditions for circulation system were: linear gas flow rate 0.5 m/sec, initial and final ammonium carbonate concentration 100-120 g/l and 10-15 g/l, respectively, a spray density 1.5-2.0 cu m/sq m hr, and hydrogen peroxide expenditure 4 kg/1000 cu m. Thus, the nitrogen oxides concentration decreased from 0.2 to 0.05%, corresponding to an efficiency of 75%. The hydrogen peroxide expenditure could be reduced to 2.5 kg/1000 cu m when a pH range of 10-11 and a temperature of 20 C was applied. Under such conditions, and with a contact time of 1.5 sec, an efficiency of 80% was reached. The ammonium nitrite and ammonium nitrate content in the spent solution was 63 and 82 g/l, respectively.

21210 APTIC NO. 39896

Lakhno, E. S. and V. F. Dokuchaeva

HYGIENIC ASPECTS OF URBAN VERDURIZATION. *(Gigienicheskie voprosy ozeleneniya gorodov). Hyg. Sanit. (English translation from Russian of: Gigiena i Sanit.), 36(3):445-447, March 1971. 4 refs.*

NTIS: TT 71-50122

Green areas are an important factor in environmental sanitation. A 5-year program for planting in populated areas in the Ukrainian SSR includes an extensive system of urban and suburban parks, gardens, groves, reservations; planting of up to 30% of urban land in reconstructed areas and up to 40-50% in new districts; afforestation of wastelands; and provision of a supply of water to planted recreation areas. Streets are to be planted with tree species for protection against dust and gases, as well as windbreaking effects.

21211 APTIC NO. 39954

Landgraf, George F. and R. W. McGuire

THE ELECTRIC AIR CLEANER. *Iron Steel Engr., 30(10):106-110, Oct. 1953.*

The development of equipment for removing fine dirt particles from the air by electrostatic precipitation, the most practical means available, is outlined, and the operation and applications of tubular and plate-type precipitators, and of the modified design that provides separate ionizing and collecting sections, are described. The detailed type and size of an electrostatic filter for any given application depends entirely on efficiency requirements; the weight method and the more practical dust-spot method for determining filter efficiency are reviewed. Once the dust has been collected on a filter, it is usually removed by washing; the frequency depends on the amount of dirt in the atmosphere and can range from once a week to once every several months. 0

21212 APTIC NO. 40576

Lang, Ludwig

PROCEDURE AND DEVICE FOR THE PURIFICATION OF THE EXHAUST GAS FROM INTERNAL COMBUSTION ENGINES. *(Procede pour epurer les gaz d echappement de moteur a explosion et dispositif pour la mise en oeuvre de ce procede). Text in French. (Ingenieurbureau fuer Angewandte Physik und Chemie (West Germany)) French Pat. 2,054,006. 27p., April 5, 1971. (Appl. July 1, 1970, 24 claims).*

The invention is concerned with a process and the necessary device for the cleaning of the exhausts from internal combustion engines, where a homogeneous, combustile, and inflammable mixture is produced by a butterfly valve that determines the hydraulic resistance in the system. The air current, flowing from the air filter to the carburetor, is accelerated to about sonic to supersonic speed in idling, and additional acceleration is provided for the subsonic air flow under medium loads. The air-fuel ratio is shifted to or above one by the butterfly valve at low speeds. The turbulence produced by the butterfly valve under high loads is again destroyed by air jets, with extensive homogenization as a result. Leaning without dilution is obtained. The fuel film deposited on the carburetor nozzle walls is afterburned with a definite time lag. The mixture current from the zone of the butterfly valve is fractioned into central and wall currents, and the auxiliary air, admitted tangentially, is superimposed on this wall current in the form of a rotating current, which causes dense, poorly evaporating and still liquid parts in the fuel film to flow away. The fresh air dosaging device is synchronized with the carburetor switch rod. Precise auxiliary air dosaging is provided to maintain an oxygen rate of 0.5 2.0% by volume in the exhaust gas.

21213 APTIC NO. 40504

Langhammer, H.-J. and D. Danckert

COMPARISON OF PROCESSES FOR CONTINUOUS AND DISCONTINUOUS DESULPHURIZATION WITH DIFFERENT DUSULPHURIZING AGENTS. *Radex-Rundschau (Austria), no. 1:3-26, 1972.*

Processes for the continuous and discontinuous desulfurization of pig iron are examined. The test results are presented and compared, taking into account the effect of the initial sulphur content, the type and quantity of desulphurizer, the rate of injection, and the type and quantity of the carrier gas on the degree of desulphurization. Sulfur is removed from pig iron by mechanical stirring of the molten iron with lime and calcium carbide or lime and soda. The sulfur is converted to a solid and trapped in the slag. Removal of sulfur in the slag avoids the air pollution problems associated with oxygen blowing treatments. The discontinuous agitator process is better than the other methods with regard to the obtainable degree of desulphurization, the desulphurizer consumption, and the amount of time required. Disadvantages of the discontinuous agitation process are its insufficient reliability in service and the fact that it cannot be used for treatment in submarine ladles. For processing large quantities of pig iron, the discontinuous dipped lance method is simpler and more reliable. The continuous desulphurization of the pig iron next to the blast furnace offers advantages mainly in the case of small furnaces with only one tap. As desulphurizers, mixtures on a carbide and lime base seem most suitable. The only reasons against the use of lime are the disadvantages inherent in the higher specific consumption. (Author summary modified)

21214 APTIC NO. 40160

Lawrence, William F., Charles F. Cockrell, and Richard B. Muter

POWER PLANT EMISSIONS CONTROL. *Mining Congr. J., 58(4):84-87, 90-94, April 1972. 14 refs.*

Coal fired power plant emission control oxides of nitrogen and sulfur needed to meet regulations under the Clean Air Act are reviewed. There are many processes available and under study for the removal of sulfur dioxide. Injection of finely powdered limestone into the boiler flame causes the sulfur oxides to be absorbed on a solid that may be collected in existing precipitators. Limestone injection followed by wet scrubbing offers intermediate control of sulfur oxides until gasification or liquifaction of coal is perfected. These processes permit removal of sulfur from the fuel before it is used. Wet scrubbing also removes some of the nitrogen oxides emitted. Particulate emissions are controlled by electrostatic precipitators. Hydrocarbon and carbon monoxide emissions indicate inefficient operation and thus furnish their own incentive for control. Power plant emissions do not include photochemical oxidants, although nitrogen oxides may promote this solution. Mercury emissions are little known at present because little work has been done on forms and distribution of mercury in coal or on its reactions during combustion and in flue gases. (Author conclusions modified)

21215 APTIC NO. 39992

Le Merer, M. Robert

RESULTS OF TESTS ON DIESEL ENGINES. *(Resultats d essais sur moteurs diesel). Text in French. Ingrs. Automobile (Paris), 44(7):372-377, July 1970.*

Experiments concerning electronically controlled injection on diesel engines were conducted at the firm of BUDI. The aim is to master the injection at the level of the injector. With the conventional mechanical method, the injection lasts as long as the injector needle is kept open, but it is controlled by the variable injection pressure. With the electronically controlled system, the pressure ahead of the injector is kept constant, and injection rate is determined by the time of opening only. The rate can easily be changed during the cycle by the angular displacement of an electrical signal. A comparison of test results between mechanical and electronically controlled injection reveals that, while maximum pressures attained were equal, both at 1500 and 2400 rpm, the pressure rise with electronic control was softer, particularly at 1500 rpm, resulting in reduced noise. Specific fuel consumption was similar for both systems. Electronic injection is very promising, chiefly because it permits improved control.

21216 APTIC NO. 40470

Loeffler, Friedrich and Wilfried Muhr

COLLECTION OF SOLID PARTICLES AND DROPLETS ON CIRCULAR CYLINDERS AS A RESULT OF INERTIAL FORCES. *(Die Abscheidung von Feststoffeilchen und Tropfen an Kreiszylindern infolge von Traegheitskraeften). Text in German. Chem. Ing. Tech., 44(8):510-514, April 1972. 14 refs.*

Inertial forces play a predominant role in the collection of particles or droplets having diameters from about 0.5 to 1.0 micron. Under certain conditions the particles impinge upon the obstacles, e.g., circular cylinders, located in the field of flow. The extent of deposition results from the product of the target efficiency and the probability of adhesion. Both effects can be determined. Expressions and results are discussed for calculation of particle trajectories up to impingement on the collecting cylinder and comparisons are made with experimental results. Various approximative equations are given. In particular, the results of new calculations are reported which, in the case of large Reynolds numbers with regard to flow round the cylinder, are the first to take account of the boundary layer at the cylinder. Since the probability of adhesion on collision of the particles with the cylinder is often less than 100% it must be determined empirically. A preliminary experimental result is reported. The collison was observed by means of high-frequency cinematography. A qualitative evaluation indicates that the probability of adherence decreases with increasing speed.

21217
APTIC NO. 40327

Mahant, R. P.

A THEORETICAL STUDY OF A PROCESS FOR THE RECOVERY OF ELEMENTAL SULPHUR FROM PYRITE. *Warren Spring Lab., Stevenage (England), Dept. of Trade and Industry, Rept. LR 142(ME), 18p., Dec. 1970. 10 refs.*

A high temperature process for the recovery of elemental sulful from pyrite concentrate is examined. The pyrite concentrate is thermally decomposed to pyrrhotite and sulfur gas; the pyrrhotite is steamed and roasted in a specified proportion to produce hydrogen sulfide and sulfur dioxide gases which are catalytically reacted in a stoichiometric ratio to yield liquid sulfur. On the basis of energy and material requirements, the process is assessed with respect to economics, i.e., price of products compared with price of raw materials and operating and capital costs of proposed process equipment. Mainly because of the large quantity of steam and fuel required, with subsequent high costs, the process is not considered economically feasible. A hydrometallurgical treatment of the pyrite concentrate which can be operated at moderate temperatures and at lower economic outlays is proposed as an alternative. (Author conclusions modified)

21218
APTIC NO. 39822

Major, William S.

SMOKE AND DUST ABATEMENT FROM SMALL INDUSTRIAL PLANTS. *Interdepartmental Committee on Air Pollution, Washington, D. C., Air Pollut., Proc. U. S. Tech. Conf., Washington, D. C., 1950, p. 434-442. 8 refs. (May 3-5, Louis C. McCabe, ed.)*

Methods of reducing smoke, cinder, and fly ash from the exhaust stacks of small coal-fired boiler plants are discussed. Because few of the boilers are equipped with heat recovery equipment such as economizers or air heaters, there are fewer dust trapping paths to remove a portion of the dust from the combustion gases before they are discharged to the stack. Careful firing practice is extremely important in achieving the low smoke density required under municipal ordinances. With hand firing, three accepted methods of good firing are coking, alternate or strip, and spreading. With stoker firing, a continuous, uniform feed of the proper size of coal across the full width of the stoker hopper is essential. There is a wide range of equipment for reducing the dust from the diversified conditions of small boiler plants. Collection efficiency is largely affected by the size, shape, and density of the fly ash particles. High-draft-loss collectors, which employ centrifugal force to separate the dust from the gas stream, are available is three basic types: the large cyclone, the small cyclone, and the tubular element. Stack sprays are another means of reducing fly ash discharge.

21219
APTIC NO. 40954

Manfredi, Frank A.

SYSTEM FOR REDUCING AND CONTROLLING EXHAUST EMISSIONS FROM INTERNAL COMBUSTION ENGINES. *(Assignee not given.) U. S. Pat. 3,640,254. 10p., Feb. 8, 1972. 4 refs. (Appl. Feb. 5, 1970, 20 claims).*

In contrast with prior art arrangements and devices, a system is described which is primarily concerned with improving engine performance and combustion to reduce undesired exhaust emissions. This is done not by merely forcing or ramming a quantity of air through the carburetion and fuel delivery system of an engine, but rather, by utilizing a relatively simple blower device to move supplemental air into the intake manifold of an engine at a point downstream from the conventional carburetion device associated with the engine. The blower device is preferably of the type which can be driven by a small electric motor from a 6 or 12-volt source with no more consumption of electrical power than would be experienced with a typical blower fan for a heating system in present day automobiles. The advantage of such a blower system is that it does not tax the output of the engine in a serious way by requiring a driving connection to the crank or other power output of the engine. The present system also provides for a controlled addition of liquid vapor into the intake manifold simultaneously with the introduction of supplemental air.

21220
APTIC NO. 40074

Marks, A. M.

CHARGED AEROSOLS FOR AIR PURIFICATION AND OTHER USES. *Preprint, American Inst. of Chemical Engineers, New York, 54p., 1971. 21 refs. (Presented at the American Institute of Chemical Engineers, National Meeting, 69th, Cincinnati, Ohio, May 16-19, 1971, Paper 25d.)*

In the charged aerosol air purifier described, water is fed through a capillary tube under a small pressure into the stream of polluted air within a conduit. A ring electrode is located downstream of the capillary tube, insulated from the conduit, and charged positive or negative relative to the grounded capillary tube. For practical reasons, it is preferred to ground everything except the ring electrode. As the potential difference is increased the diameter of the charged droplets decreases, and these are pulled downward in the electric field with increased velocity and frequency. At a critical voltage approximately equal to 3 kv for a 1-centimeter spacing, the droplets burst into an invisible spray of submicron charged particles. Experimental data on reactions of charged aerosols with sulfur dioxide, nitrous oxide, and carbon monoxide are presented, including correlation with theory. Applications include automotive and smokestack air purifiers.

21221
APTIC NO. 40227

May, James W.

VISCOUS IMPINGEMENT FILTERS. *Interdepartmental Committee on Air Pollution, Washington, D. C., Air Pollut., Proc. U. S. Tech. Conf., Washington, D. C., 1950, p. 273-279. (May 3-5, Louis C. McCabe, ed.)*

The two broad categories of viscous impingement filters - unit filters and automatic self-cleaning filters - operate by dividing and subdividing the air flow into innumerable small streams by means of a multiplicity of baffles or elements. These minute streams of air change direction many times in their course of travel through the media. The dust particles cannot follow the changes in air flow and impinge upon the media elements, thus becoming trapped in the adhesive film. Operating variables include the character and size of the dust, the turbulent conditions of the air, and the arrangement and surface conditions of the media elements. A well-designed filter achieves a balance of the three primary performance criteria: collection efficiency, dust-holding capacity, and resistance to air flow. The filters are used mainly as precleaners to protect more effective filter equipment, and in installations where only a moderate degree of air cleaning is required. The physics of viscous impingement, design and performance factors, methods of filter use and reconditioning for disposal of the collected materials, and applications are reviewed.

21222
APTIC NO. 39953

McCabe, Louis C.

ATMOSPHERIC POLLUTION. *Ind. Eng. Chem., 44(6):103A-104A, 106A, June 1952. 2 refs.*

Data on gas volume, process weight ratio, sulfur dioxide content, and other constituents, grain loading, and particle size are summarized for stack gas emissions from gray iron foundries. Limited but favorable experience in complying with Los Angeles regulations on grain loading from this source is described for the electric furnace, gas or oil-fired reverberatory furnace, and continuous gas-fired rotary melting furnaces. Two or more types of equipment may be required to control gases from these cupolas since there does not appear to be any single, inexpensive dust recovery technique. Several possible combinations of equipment are noted. Several types of equipment, including the high-temperature baghouse, electric precipitator, and scrubber/closed-top cupola combination, seem to be potentially capable of satisfactory control. Capital and operating costs may be the deciding factor in the choice of methods adopted. The experience of one firm with a high-temperature baghouse is described.

21223 APTIC NO. 39955

McCabe, Louis C.

ATMOSPHERIC POLLUTION. *Ind. Eng. Chem., 45(11):109A-110A, 112A, Nov. 1953.*

Data on particle size specific gravity, grain loading, gas volume, and composition of emissions from iron-melting cupolas are given. In addition to carbon monoxide, the cupola emits dust depending on the melting rate at which it is being operated and the amount of combustible materials in the charge. The efficiencies of various types of equipment available for dust suppression from this source are evaluated, ranging from the cheapest and least efficient, the screen cage, to a combination hot blast and baghouse collecter which has an efficiency as high as 98%. In the recently developed hot blast electrostatic precipitator, the CO gas is burned and used to heat the cupola blast air, and up to 97% of the particulate matter is collected.

21224 APTIC NO. 39801

Meuly, Walter C. and Breckinridge K. Tremanine

ABATEMENT OF SULPHATE MILL MALODORS BY ODOR MASKING AGENTS. *Tappi, 36(4):154-161, April 1953. 18 refs. (Presented at the Alkaline Pulping Conference of the Technical Association of the Pulp and Paper Industry, 6th, Mobile, Ala., Nov. 12-14, 1952.)*

A method of masking the principal airborne kraft mill malodors (volatile sulfur compounds) by means of odor-masking agents introduced into the digesters and released simultaneously with the malodors throughout the kraft process is described. The modified kraft odors are less intense and less offensive. The simplicity of application, masking power at very high dilutions, and pervasiveness are discussed. Laboratory studies and extensive field tests are also described. A rational explanation of odor masking is attempted, based on semiquantitative odorimetric measurements of odor quantities and degree of masking. For this purpose, the values of scent unit, scent value, gram scent value, mask unit, mask value, and masking ratio are introduced and defined. These values and measurements permit an estimate of kraft mill odors and of quantities of masking agents required. Laboratory results have been supported by literature and field data. (Author abstract modified)

21225 APTIC NO. 40194

Meuly, Walter C. and C. David Ruff

NEW METHOD FOR MERCAPTAN AND H2S REMOVAL FROM GASES AND LIQUIDS. *Paper Trade J., 156(21):34-36, May 22, 1972. 12 refs.*

The Cataban process is based on the one-step continuous catalytic oxidation of hydrogen sulfide and alkyl mercaptans contained in fluid streams by means of atmospheric oxygen. The product of the instantaneous reaction is elemental sulfur, which may be recovered by mechanical means or may be left in the stream since it is odorless and nontoxic. The oxidation proceeds well at ordinary temperature and pressure, and the requirement for equipment is essentially a single unit providing an efficient means of contacting the aqueous catalyst phase with the gaseous stream containing hydrogen sulfide and oxygen. Cataban, the catalyst for the reaction, is a clear concentrated aqueous solution of a chelated inorganic iron salt which is diluted with water. The process involves an oxidation-reduction system, in which a complexed polyvanlent metal ion, preferably ferric ion, kept in aqueous solution by an organic chelating agent, oxidizes hydrogen sulfide to sulfur, with reduction to the ferrous iron state. Simultanously atmospheric or other oxygen reoxidizes the ferrous iron complex to the ferric state. The Cataban solution can serve indefinitely. Details of equipment employed and implementation variables are provided. Also other processes for hydrogen sulfide removal are briefly described.

21226 APTIC NO. 39885

Meurer, Joachim Siegfried

UNCONVENTIONAL ENGINES. *Society of Automotive Engineers, Inc., New York and Federation Internationale des Societes d Ingenieures des Techniques de l Automobile, Brussels (Belgium), Intern. Auto. Safety Conf., Proc., Brussels, Belgium, 1970, 58p. (Paper 15.2.A.)*

Current and anticipated progress in developing the Stirling engine, steam engine, Wankel (rotary piston) engine, and gas turbine for road vehicle propulsion is assessed. Thermal efficiency or specific fuel consumption, lubrication oil consumption, engine price, maintenance costs, weight/output ratio, service life, torque characteristics, multi-fuel capability, governing and starting period, noise level, and exhaust gas characteristics are considered for each engine type.

21227 APTIC NO. 40346

Meyers, R. A., M. Gardner, A. Grunt, J. S. Land, J. L. Lewis and C. C. Shih

APPLICABILITY OF ORGANIC SOLIDS TO THE DEVELOPMENT OF NEW TECHNIQUES FOR REMOVING OXIDES OF SULFUR FROM FLUE GASES. (FINAL REPORT). *TRW Systems Group, Redondo Beach, Calif., Applied Chemistry Dept.; TRW Systems Group, Redondo Beach, Calif., Chemical Engineering Dept.; and TRW Systems Group, Redondo Beach, Calif., Chemical Engineering Lab., Air Pollution Control Office Contract PH22-68-46, Rept. APTD-0719, 10669-6012-RO-00, 206p., April 15, 1970. 194 refs.*

NTIS: PB 206907

The applicability of organic solids to the development of new techniques for the removal of sulfur oxides from flue gases is discussed. A detailed literature search was made with selection of promising organic solids for removing sulfur dioxide from flue gas. A preliminary chemical systems analysis was performed for sulfur dioxide removal materials. Laboratory data on the ability of selected organic solids to sorb sulfur dioxide under simulated stack conditions is presented. Cellulosics are promising. Cellulose-containing materials such as wood, cotton, and newsprint were able to sorb sulfur dioxide from synthetic flue gas streams at operating temperatures. Preliminary engineering designs and estimates of investment and operating costs for control of four sulfur dioxide contamination sources are discussed. The process designed for utilizing cellulosics would employ a moving bed of shredded paper as a sorbent of sulfur dioxide from flue gas streams. The sulfur dioxide is subsequently removed from the paper by thermal desorption for use as a feed stream in sulfuric acid manufacture. The economic evaluation of the sulfur dioxide removal and recovery process as applied to the four specified cases led to the conclusion that the process could be attractive compared with other processes for removing sulfur dioxide from flue gases, provided that the newsprint could undergo a large number of regenerations without losing sorptive capacity or decomposing.

21228 APTIC NO. 40521

Miura, Mitsugu

DESULFURIZATION OF WASTE GAS BY WHIRLING GAS IN CONTACT WITH LIQUID. *(Senkai ryukieki sesshokuho ni yoru haien datsuou ni tsuite). Text in Japanese. Nenryo Oyobi Nensho (Fuel and Combustion), 38(8):467-474, July 15, 1971.*

One type of scrubber (one cylinder with a single partition) is used to eliminate dust, and the other type (one cylinder with multiple partitions) is used for the removal of sulfur dioxide from the boiler waste gas, gas absorption, deodorization, and fume elimination. Both scrubbers use high speed whirling gas which is in contact with liquid. The liquid tank is in the bottom of the scrubber, and the waste gas enters through a cage with many slits in the lower part and exits again through a cage with slits in the upper part of the cylinder scrubber. Some of the advantages of the new device are the high contact capacity of the gas with liquid, the elimination efficiency of fume-like dust, and the minimum amount of liquid required for the process (1/20 or 1/30 of the amount consumed by the other methods), in addition to the simplicity and low cost of the unit itself. The scrubber with multiple partitions can not only remove sulfur content, but also absorb hydrochloric acid gas, nitrogen oxides, and hydrogen sulfide gas.

21229 APTIC NO. 40483

Miyauchi, Sadao

FANS FOR SULPHUR DIOXIDE ABSORPTION PROCESS. *(Haien datsuryu sohuki). Text in Japanese. Mitsubishi Denki Giho (Tokyo), vol. 46:225-228, Feb. 1972. 6 refs.*

Fans for the sulfur dioxide absorption process have the following characteristics: two closing dampers, one in front, and one in the rear; an air control damper is attached; small installation space; a large air supply range. In a forced draft fan, the corrosion was mainly caused by the sulfur trioxide in exhaust gas. The SO3 concentration in the exhaust gas was approximately 20 to 60 ppm when heavy oil containing 3% sulfur was subjected to burning. The dew point in exhaust gas was usually higher than that of water vapor. However, an occasional low dew point causes severe corrosion. The exhaust gas from a wet process contains sulfur compounds mainly as a mist of sulfate ion. Materials suitable for use at this condition are austenite stainless steel or two to three of the British standard nickel-chromium steels. Lining steel with chloro-vinylidene polyester, phenol, natural rubber, or chlorinated rubber can also be used. The effect of sulfur dioxide on health are mentioned. Sulfur dioxide absorption processes include those using ammonia, activated manganese dioxide, calcium oxide or carbonate, and soduim sulfite.

21230 APTIC NO. 40071

Morse, William

ALKALINE POWDER DOSING MINIMISES NUISANCE OF ACID SMUT EMISSION. *Process Eng. Plant Control, 1971:69-70, Jan. 15, 1971.*

The common problem of acid smuts from oil-fired boilers falling near factory chimneys can be solved by the injection of a very fine spray of alkaline powder into the flue gas to neutralize and dry up the acid condensation. A special insufflator, the Alkajector, injects the powder where it is most likely to be effective not into the boiler, but into the economizer, in a direction opposite to the boiler gas flow. This is done to turn the powder around and give the best possible mixing. Known as D.C.P. 58 sulfo-neutralizer, the powder consists mainly of calcium and magnesium carbonates.

21231 APTIC NO. 40642

Muermann, Herbert

STATE OF THE ART OF AIR FILTERS FOR VENTILATION SYSTEMS. *(Stand der Luftfilter fuer lueftungstechnische Anlagen). Text in German. Wasser Luft Betrieb, 16(5):144-152, May 1972. 2 refs.*

Air filters are used for separation of low concentrations of solid or liquid pollutants from atmospheric air, from the circulating air in ventilation, air heating and air conditioning systems. Sometimes air filters are installed behind dust collectors. The efficiency of air filters is determined by the pressure loss, the dust quantity which it is capable of retaining, the length of intervals between cleaning or replacement and the collection efficiency. There are three groups of air filters: coarse filters (for dust particle sizes of 100 to 10 micron), fine filters (10 to 1 micron), and finest filters (1 to 0.1 micron). Coarse filters are made of oil-wetted metal mesh, fine filters of cloth, and finest filters are also made of cloth. Electrostatic precipitators must be also included in the last group. The dust collection in oil-wetted metal filters is based on the forces of inertia through frequent deflection of the gas flow. The dry layer air filter operates on the same principle. Cloth filters, paper filters, and glass fiber filters belong to the so-called sifting filters. There are two types of cloth filters, bag filters and envelope filters. The envelope filters have the advantage that a large collection area can be accommodated on relatively small space. Not all dust collection problems can be solved by means of one type of filter. In many cases an efficient combination of two different types of filters will be required.

21232 APTIC NO. 40270

Muhlrad, W. and J. Remillieux

CONTEMPORARY TRENDS IN THE CONCEPT AND UTILIZATION OF FILTRATING TISSUE SEPARATORS FOR THE TREATMENT OF METALLURGICAL FUMES. *(Tendances actuelles dans la conception et l utilisation des separateurs a tissu filtrant pour le traitement des fumees metallurgiques). Text in French. Rev. Met. (Paris), 69(3):197-205, March 1972.*

Contemporary trends in the concept and utilization of filtrating tissue separators in metallurgy are shown. As a result of recent developments and the increased life expectancy, tissue filters continue to be superior to all other techniques in metallurgy. Artificial fibers are superior to natural ones, and can be used at fairly high temperatures (80-90 C for polyethylene, 275-300 C for silicon or graphite-glass fibers, and 800-900 C for silicoaluminous fibers). While woven filters are widely used, classic felt filters are of minor importance. Long-life needle-punched filters represent a new and promising development. While the individual dust removal from single filter elements by means of an air jet is not applicable for non-cohesive dusts and high throughput capacities, dust removal by cells is possible by means of countercurrent, possibly combined with vibration. With cylindric filters predominant, panel-shaped and chamber filters represent a new trend. The requirements for easy, low-cost maintenance and replacement are increasingly considered. The trends of increased dimensions and high life expectancy are manifest. Examples for the use of tissue filters in metallurgy are given. Wet dust separation is applied for waste gases from oxygen converters, while the cooled gases from arc furnaces are treated by means of polyester or glass-fiber filters. Gases from Martin furnaces are cleaned by glass-fiber filters at 250-275 C. Gases, cooled or not, from ferrosilicon furnaces are best filtered by filter tissue separators.

21233 APTIC NO. 40102

Mullins, R. C. and J. D. Hatfield

EFFECTS OF CALCINATION CONDITIONS ON THE PROPERTIES OF LIME. *Am. Soc. Testing Mater. Spec. Tech. Publ., no. 472:117-131, 1970. 6 refs.*

Experiments were made to define quantitatively the effects and interactions of the time of calcination, the temperature of calcination, and the particle size of pure limestone upon the properties of the calcine that may affect the absorption of sulfur dioxide from flue gases. Response surfaces were derived for the degree of calcination, pore volume, density, crystallite size, and capacity to absorb SO2 as functions of the calcination conditions, and predictions in regions difficult to investigate were made. The results, while somewhat speculative, show that the temperature of injecting limestone into a furnace and its retention time significantly affect its capacity to absorb SO2 and other properties of the calcine. The particle size of the limestone affects the calcination rate only slightly. Fine grinding of the limestone is of doubtful value for SO2 absorption, particularly if the calcination temperature is high. (Author conclusions modified)

21234 APTIC NO. 40294

Myers, Phillip Samuel and Otto Arthur Uyehara

PROCEDURE AND DEVICE FOR REDUCING UNDESIRABLE ELEMENTS IN THE EXHAUSTS FROM INTERNAL COMBUSTION ENGINES. *(Procede et appareil pour reduire l emission d elements indesirables par les moteurs a combustion interne). Text in French. (Assignee not given.) French Pat. 2,052,281. 24p., March 29, 1971. (Appl. Feb. 10, 1970, 17 claims).*

The invention is concerned with a procedure and the necessary device for the reduction of unburned hydrocarbons, carbon monoxide, and nitric oxide emissions from internal combustion engines. Stratified charge is formed in the cylinder, it is composed of an air-fuel mixture, specially adjusted to produce minimum NO and recycled and recompressed unburned gases from the previous cycle, to which air is added for full oxidation. The amount of the exhaust recycled is inversely proportional to the desired motor load. The ignition is made in the zone of the air-fuel mixture, and the recompressed exhaust is located between the air-fuel mixture and an exhaust opening. While the main exhaust valves are open during the total exhaust and suction strokes, one of the auxiliary exhaust valves is open during an initial period of the exhaust to eject the recompressed mixture, and again during a final stage of the exhaust to eject the unburned gases of the minimum NO mixture into a chamber. Another auxiliary exhaust valve opens in the meantime to exhaust the gases into another chamber, and again during the final stage of the suction stroke to suck in the same exhaust, mixed with air. Good fuel utilization is provided by the above procedure.

21235 APTIC NO. 39819

Neumann, E. P., C. R. Soderberg, Jr., and A. A. Fowle

DESIGN, APPLICATION, PERFORMANCE, AND LIMITATIONS OF SONIC TYPE FLOCCULATORS AND COLLECTORS. *Interdepartmental Committee on Air Pollution, Washington, D. C., Air Pollut., Proc. U. S. Tech. Conf., Washington, D. C., 1950, p. 388-393. (May 3-5, Louis C. McCabe, ed.)*

A collection system employing sonic generators in conjunction with a secondary collector is described in which an agglomerator increases the effective particle size of a gas bearing some, entrained matter by a ratio defined as the index of agglomeration. This new aerosol is delivered to a secondary separator for removal of as much of the entrained matter as possible. Since the efficiency of most centrifugal collectors prohibits collection of particles less than one micron in size, it is the function of the sonic agglomerator to increase the effective particle size of the aerosol to a point where it can be collected with reasonable efficiency. Some of the particles are removed in the sonic chamber but the majority are separated in the secondary collector, and the aerosol is delivered to the clear gas outlet with a markedly reduced grain loading. The two most applicable secondary collectors are impingement separators and cyclones.

21236 APTIC NO. 39960

O Mara, Richard F.

DUST AND FUME PROBLEMS IN THE STEEL INDUSTRY. *Iron Steel Engr., 30(10):100-106, Oct. 1953. 6 refs.*

The major areas in a typical steel plant operation where some form of dust or fume control equipment is applicable are reviewed. Hoods, ventilating fans, and cloth filters can be used in the screening segment of ore handling operations. Mechanical collectors used in combination with electric precipitators have a recovery efficiency of 98-99% in the sintering plant. Dust from the coke screening plant can be controlled with hoods, ventilation, and recovery equipment. The advent of center inlet design in blast furnace gas precipitators has proven advantageous; however, adequate precipitation equipment for open hearth emissions has not yet been developed. Bessemer converters present the greatest difficulties in dust control; hooding problems are discussed. Test data indicate that electrical precipitation is applicable. The design of control equipment, including scrubbers and electric precipitator, for electric furnaces is considered. Other in-plant emission sources are noted: limestone and coal handling, coke oven gas cleaning, open hearth raw materials, department power house, blooming mill operations (scarfing machines), hot strip mills, pickling plant, and powdered fuel heating furnaces.

21237 APTIC NO. 40384

Oblaender, Kurt and Joerg Abthoff

STATE OF DEVELOPMENT OF THERMAL AND CATALYTIC AFTERUBRNERS FOR OTTO ENGINES. *(Entwicklungsstand der thermischen und katalytischen Nachverbrennung bei Ottomotoren). Text in German. Motortech. Z. (Stuttgart), 33(5):206-213, May 1972. 6 refs.*

Thermal afterburning of exhaust gases began in 1966 with the introduction of the man-air-ox-system. There are two types of thermal reactors: lean reactors operated with a fuel/air ratio of lamda 1.1 to 1.2 and rich reactors operated with a fuel/air ratio of lamda 0.8 to 0.9. The latter type has the advantages of lower nitrogen oxides and hydrocarbon emission compared with the lean reactor, a more space-saving design, and the possibility of exhaust gas return. In case of failure of one or more spark plugs, the rich reactor reaches temperatures of more than 1000 C and requires interruption of the secondary air supply; this is not required with the lean reactor. Catalytic reactors can be used as either reduction or oxidation catalyst. Thermal as well as catalytic afterburning requires higher exhaust gas temperature. Measures which increase the temperature can be divided into three groups. First, delayed ignition, higher rpm during idling, [illegible] switching to higher gear by automatic gears, and adjustment of a lean mixture all increase the quantity of exhaust gas and raise the temperature. The second group comprises measures involving the afterburner itself (e.g., catalysts with low specific heat intake, optimum layering of the catalyst, insulation of the exhaust gas pipe and the catalyst pot). Thirdly, preheating of the catalyst and the engine can bring the desired temperature rise. A comparison of the efficiencies of catalytic and thermal afterburners yields better results for the former.

21238 APTIC NO. 40438

Okamoto, Kazutada and Hiroshi Kuroda

PRESENT STATUS AND FUTURE PROSPECT OF AUTOMOTIVE ENVIRONMENTAL CONTROL. *(Jidosha kogai taisaku no genjo to shorai). Text in Japanese. Jidosha Gijutsu (Automobile Eng.), 26(1):31-36, Jan. 1972. 8 refs.*

Joint research programs on the control of engine exhaust gas were established by automobile manufacturers and petroleum refineries in the U. S. and Europe. The control methods include reducing evaporation, decreasing unburned hydrocarbons and carbon monoxide in engine, inhibiting the formation of nitrogen oxides, and treating of exhaust gas, such as the oxidation of hydrocarbons, carbon monoxide, NOx. The major problems include: for the exhaust gas recycling, there is limit for the decrease of NOx; large deterioration of the operation of engine; the control of recycling is difficult; dirt in engine recycling system are large; for the thermal reactor, thermal resistant material for the interior has not been established; it is difficult to keep the internal temperature at HC and CO oxidation temperature for various operation conditions, and thus the fuel cost increase; for HC and CO catalysts, the durability is small even using non-lead gasoline; abrasion loss is large for granular catalyst; for NOx catalyst, there are common problems as that of the HC and CO catalysis; catalysts for small ammonia formation and good NO_x conversion are difficult to find; for the control of microparticles, the measurement method has not been established; it is necessary to retreat the collected materials.

21239 **APTIC NO. 39947**

Paul, Claude and Louis Grandet

DESULFURIZING MASS. *(Masse desulfurante). Text in French. (Azote et Produits Chimiques S. A. (France)) French Pat. 2,053,477. 7p., April 5, 1971. (Appl. July 7, 1969, 5 claims).*

A new mass of high efficiency and mechanical resistance, developed for the desulfurization or hydrodesulfurization of gases and vapors containing inorganic and organic sulfur compounds is described. The mass, composed of zinc oxide and 20-25% of magnesia or magnesium hydroxide, contains 1-4% of some lubricant, degradable by heat. The paste obtained after the zinc oxide and the magnesia were mixed in the presence of water, can be molded and dried, or granulated after drying. Catalysts such as copper oor cobalt molybdate or tungstate (3-10%) are added to masses to be used for hydrodesulfurization. If thioethers and thiophenes are absent, the desulfurization is practically complete at pressures ranging from barometric to 100 bars in a temperature range of 350-450 C. Two-stage desulfurization is applied in the presence of the above impurities. The treatment of liquid petroleum products in gaseous phase in a pressure range of 10-100 bars at 300-400 C has an efficiency of 40-80%. Hydrodesulfurization is usually applied as a second stage of treatment, particularly if petroleum products with sulfur contents below 1 mg/kg should be obtained.

21240 **APTIC NO. 40652**

Pavlovskiy, Ye. I.

DETERMINATION OF THE FRACTIONATION EFFICIENCY OF DUST SEPARATORS. *(Opredeleniye fraktsionnoy effektivnosti pyleuloviteley). Text in Russian. Khim. Prom. (Moscow), no. 3:220-221, 1972. 7 refs.*

Problems involved in the determination of the fractionation efficiency of dust separators were studied. The absolute errors of three different methods of determining the fractionation efficiency (from the dispersity of the separated and original dust, of the non-separated and original dust, and of the non-separated and separated dust) were calculated for three different over-all efficiencies (60, 80 and 90%) and 5 and 10% relative error. Increased error of the first method with increased over all efficiency was observed, while the errors of the second and third methods decreased with the efficiency. It was possible to obtain reliable data with minimum relative error only. Fractionation efficiencies of different cyclones were determined by means of the three above methods. The curve obtained for the particle-radius dependence of the fractionation efficiency revealed the superiority of the second and third methods to the first one. The intersection of the differential curves describing the particle distribution as a function of the particle size for the original, the separated and the non-separated dust determines a fractionation efficiency which corresponds to the over-all efficiency. The results obtained by means of the dispersity analysis can be corrected by the differential curves for the original, the separated, and the non separated dust.

21241 **APTIC NO. 39939**

Payne, A. J.

THE CAT-OX SYSTEM. *Chem. Age India, 21(6):642-644, June 1970.*

A catalytic oxidation system designed to remove sulfur dioxide and fly ash from flue gases emitted by power stations and other large industrial plants is described. Virtually all ash and 85 or 90% of the SO_2 is removed, depending upon whether the system is installed as an independnt reheat system or integrated into the boiler design. The system converts the SO_2 into usable sulfuric acid which can be sold commercially, thus offseting operating costs. The integrated Cat-Ox system comprises a precipitator, converter, economizer, air-heater, absorbing tower, and mist eliminator. The precipitator removes the fly ash and dust-free gas enters the converter. Sulfur dioxide is combined with free oxygen to form sulfur trioxide. The SO_3 formed in the converter reacts with water vapor in the flue gas to produce H_2SO_4. The flue gas, containing the H_2SO_4 vapor, is then cooled to just above the acid dew point in the next two stages, the economizer and air-heater. In the absorbing towers, the flue gases are brought into direct contact with a stream of cooled H_2SO_4 which cools them to 225-250 F. As a result the H_2SO_4 vapor in the gases is condensed. Some of the liquid H_2SO_4 in the form of a very fine mist is entrained with the flue gas stream and passed to the mist eliminator where the H_2SO_4 is recovered and the cleaned flue gas is exhausted to the atmosphere.

21242 APTIC NO. 40224

Pinolini, Franco

DIESEL EXHAUST SMOKE CONTROL THROUGH VARIATION OF FUEL PUMP DELIVERY SETTING USING AN ELECTRONIC CONTROL SENSITIVE TO EXHAUST TEMPERATURE CHANGES. *Society of Automotive Engineers, Inc., New York and Federation Internationale des Societes d Ingenieures des Techniques de l Automobile, Brussels (Belgium), Intern. Auto. Safety Conf. Proc., Brussels, Belgium, 1970, 17p. (Paper 15.3 C.)*

Acceptable levels of diesel smoke density and engine thermal load are guaranteed by a device capable of changing the amount of fuel delivered to the engine when a present exhaust-gas temperature is exceeded. Exhaust temperature is measured at the exhaust manifold by a thermocouple whose voltage is suitably amplified. If the exhaust temperature is excessive, the voltage actuates an electrovalve that varies the fuel-injection pump setting in order to maintain a satisfactory air-fuel ratio. Advantages other than smoke control are reduced fuel consumption and reduced engine maintenance costs. These advantages are particularly evident of diesel trucks operating at high altitudes.

21243 APTIC NO. 40709

Powell, H. E., H. Fukubayashi, L. W. Higley, and L. L. Smith

RECOVERY OF ZINC, COPPER, AND LEAD-TIN MIXTURES FROM BRASS SMELTER FLUE DUSTS. *Bureau of Mines, Rolla, Mo., Rolla Metallurgy Research Center, Rept. Investigations 7637, 12p., 1972. 6 refs.*

GPO: 707-697:319

The smelting of brass and bronze generates a dust composed primarily of zinc oxide, with lesser amounts of other metal oxides, such as copper, lead, and tin. The small quantity of this waste generated by individual smelters and the relatively low unit value of the contained metals, suggests the desirability of reclaiming the metals onsite or at some nearby point. A process that fits these requirements was developed, which consists of dissolving zinc and copper from the dust with sulfuric acid, recovery of copper by cementation, recovery of zinc as zinc sulfate crystals, and recovery of lead and tin as a salable residue. Alternatively, zinc may be recovered by electrodeposition. Free acid is recycled and no major pollution problems are generated by the process. (Author abstract modified)

21244 APTIC NO. 40026

Prieger, Ernst

MATTER AT THE WRONG PLACE. SURPLUS AIR THREATENS WATER, AIR AND CLIMATE. RECYCLING OF SURPLUS HEAT. *(Materie am falschen Ort. Ueberschusswaerme schaedigt Wasser, Luft* *und Klima. Recycling fuer Ueberschusswaerme). Text in German. Tech. Umweltmag, no.2:28-29, April. 1972.*

In the conversion of classical forms of energy into heat only 40 to 42% of the heat is used, the rest is usually discharged into the atmosphere. In power plants only about 32% of the heat is used for the generation of electric power and 67 to 68% is drained off into rivers. Excessive thermal pollution of rivers has caused authorities to rule that water cooling is to be replaced by cooling towers. This does not solve the problem but shifts it from one of water pollution to air pollution. Instead of discharging it into the atmosphere, the surplus heat could be used for remote home heating in winter and during the summer, for drying sewage sludge; for the production of polystyrol, polyvinyl acetate, or polyvinylchloride; and for air conditioning.

21245 APTIC NO. 39879

Priestly, Robert J.

WHERE FLUIDIZED SOLIDS STAND TODAY. *Chem. Eng., 69(14):125-132, July 9, 1962. 6 refs. (Presented at the Conference des Arts Chemiques, Societe de Chemie Industrielle, Paris, France, May 3, 1962.)*

In addition to the more than 1,500,000 bbl/day of petroleum now cracked in fluidized beds, there are some 350 units in operation throughout the world outside the petroleum industry. In that industry, the principle of fluidized solids is also being used in fluid-bed coking, catalyst regeneration, platforming, and ethylene manufacture. Nonpetroleum applications include the roasting of sulfide ores and elemental sulfide ores, coal drying, plastics drying, and limestone calcination. Some newer applications are waste incineration, phosphate rock defluorination, lime sludge calcination, and cement calcination. More uses can be expected since fluid-bed processing offers many advantages in economy, efficiency, and control.

21246 APTIC NO. 39969

Pring, R. T.

CONTROL OF FUME FROM ELECTRIC STEEL MELTING FURNACES. *Air Cond. Heat. Ventil., vol. 58:121-125, Feb. 1961. 1 ref.*

Various fume control arrangements are assessed, ventilation rates computed, and gas cleaning methods and equipment are described for electric steel melting furnaces. Of existing electric steel melting furnace fume control systems installed to meet provisions of air pollution regulations, by far the majority employ roof-mounted furnace hoods in conjunction with mechanically shaken, tubular cloth filters. There is, however, a noticeable trend toward furnace shell evacuation, particularly for larger furnaces, coupled with water spray cooling and cloth filtration. Silicone-treated fiberglass filter bags cleaned by reverse air flow appear feasible. The high cost and variable performance of electrostatic precipitators in this application may be expected to confine their use to the control of fume from very large multiple furnace installations where specific conditions may rule out the use of cloth filtration. High energy scrubbers can be depended upon to do a satisfactory gas cleaning job, although at the expense of high power and water consumption. (Author summary modified)

21247 APTIC NO. 40080

Pring, Robert T.

FILTRATION OF HOT GASES. *Air Repair, 4(1):40-45, May 1954. 4 refs.*

Particularly in the case of gases from open hearth and electric steel furnaces, a reduction in either the concentration or mass rate of emission of extremely fine solid particles sufficient to meet the requirements of most air pollution control ordinances has only a minor effect on the appearance of the stack discharge. Of the gas cleaning equipment presently operating on various types of metal melting furnaces, only cloth filters have consistently produced effluent discharges free from visible solids. Orlon and fiberglass fabrics are the most useful materials for hot gas filtration. The application of cloth filtration to the cleaning of furnace gases requires in most cases that the gases be cooled in order to protect the filter fabric and to ensure economical fabric life. Radiation and convection, tempering air, and spray cooling are employed singly or in combination. Examples of hot gas filtration include grey iron foundry cupolas, electric furnaces, and open hearth steel furnaces.

21248 APTIC NO. 40603

Pring, R. T.

CONTROL OF FUME FROM ELECTRIC STEEL MELTING FURNACES. *Air Cond. Heat Ventil., 58(1):45-50, Jan. 1961. 7 refs.*

Control methods to reduce fumes from electric steel melting furnaces containing both gases and particulate matter are reviewed. Available methods include general building ventilation; mechanical ventilation through canopy hoods; local exhaust hoods mounted on the furnace roof; and direct evacuation of the furnace through a shell top. General ventilation at best is dependent on several easily upset conditions and breaks down if the quantity of rising contaminated air exceeds the capacity of the available roof openings. Canopy hoods are reasonably effective if designed properly but performance is adversely affected by building cross drafts carrying contaminants out of range of the hood. A local exhaust hood on the furnace fits closely around the area of contamination and is less affected by drafts. Emissions from electric furnaces may consist of nitrogen, carbon dioxide, oxygen, carbon monoxide, sulfur dioxide, sulfur trioxide, and vaporized hydrocarbons within the gases and various metal oxides within the particulate fractions. Health aspects of emissions and air pollution codes are also considered.

21249 APTIC NO. 40464

Rathgeber, Ferdinand

METHODS AND EQUIPMENT FOR SCRUBBING OF WASTE AIR FOR DUST REMOVAL. *(Methoden und Anlagen fuer Nassauswaschung der Abluft in der Entstaubungstechnik). Text in German. Wasser Luft Betrieb, 16(5):136-141, May 1972.*

The efficiency of wet dust collectors is based on the dust binding properties of finely dispersed water. The physical and chemical properties of a dust determine its suitability for this type of dust collection. Difficulties arise at wet dust collection when the dust contains a high fraction of fine particles which coincides with a slow sedimentation speed. The sedimentation speed can be raised by using flocculation. An efficient flocculation depends on the hardness of the water, since calcium and magnesia ions are consumed at the flocculation process. Various types of scrubbers are described and illustrated. One type of scrubber mixes the dust-laden air with water upon passage of a stationary blower. At a high-capacity venturi scrubber the gas impacts on a water curtain. Practical experience has shown that 4000 cu m combustible gas with a carbon monoxide fraction of 85% can be cleaned by this venturi scrubber to a residual dust concentration of only 20 mg/cu m. Another type of wet collector is of cylindrical shape which has the advantage of requiring a minimum amount of space. The dust-laden air enters tangetially and spirals to a water-filled tank. Recently wet scrubbers are being used at shredders. In Duisburg a large new shredder for shredding car wrecks is being erected. It will be equipped with a cyclone and two wet collectors with a total capacity of 80,000 to 125,000 cu m/hr. The sludge accumulating in wet collectors must be thickened in sedimentation basins. In most cases it can be dumped afterwards. If it contains toxic substances, however, the dehydration process must be followed by chemical treatment. If it contains enough organic components it can be burned, otherwise water-tight disposal sites must be provided.

21250
APTIC NO. 40199

Ray, Arthur B.

ROLE OF ACTIVATED CARBON IN PRACTICAL CONTROL OF ATMOSPHERIC CONTAMINATION. *Interdepartmental Committee on Air Pollution, Washington, D. C., Air Pollut., Proc. U. S. Tech. Conf., Washington D.C., 1950, p. 357-372. 17 refs. (May 3-5, Louis C. McCabe, ed.)*

Carbon requirements, equipment design and operation, and cost, processing, and plant installation factors are discussed for the adsorption by activated carbon of two types of industrial contaminants: low-boiling organic solvent vapors and highly odorous gases and vapors. In the first category, the solvents, including hydrocarbons, ethers, esters, ketones, alcohols, and chlorinated compounds, have a great enough value to economically justify the use of highly efficient activated carbon equipment for the profitable recovery and re-use of these vapors. For the second group of pollutants, activated carbon installations are used to purify air drawn into buildings by the ventilation systems and thus prevent adverse effects on building occupants, manufacturing operations, and equipment sensitive to sulfur dioxide or other corrosive gases. Carbon is also used to remove indoor odors and impurities from air recirculated in buildings and all types of transportation enclosures. Additional potential applications of activated carbon in air pollution control are suggested.

21251
APTIC NO. 39881

Reed, Robert D.

AIR POLLUTION AND THE GASOLINE PLANT. *Natural Gas Processors Assoc., Tulsa, Okla., Proc. Nat. Gas Process. Assoc., Annu. Conv., 50th, Houston, Tex., 1971, p. 85-88. (March 17-19.)*

Pollutants of concern at a gasoline plant are hydrogen sulfide, sulfur dioxide, sulfur trioxide, carbon monoxide, hydrocarbons, nitrogen oxides, and odorants as well as particulate matter, fluoride, hydrogen chloride, and visible smoke. Concern of the gasoline plant operator is with only a portion of this list, largely H2S, SO2, SO3, odorants, and smoke. Either very tight containment or thermal oxidation (incineration) is the odorant solution. Economics of SO2/SO3 removal in the case of the gasoline plant are somewhat questionable, and sulfur-free fuel is usually the least expensive expedient for boilers and fired heaters. In the case of the incinerator, a solution must be found in adequate stack height to secure adaquate diffusion of the oxides before they reach grade in the downwind direction. The most serious smokes are those produced by improper burning of gaseous or liquid hydrocarbons. These are preferably suppressed by steam at pressures of 15 psig or more.

21252
APTIC NO. 39942

Rice, Owen R.

BLAST FURNACE GAS CONDITIONING. *Iron Steel Engr., 19(12):66-89, Dec. 1942.*

The conditioning of blast furnace gas involves very large gas volumes and dust of enormous size variation with a portion of the dust consisting of extremely minute particles. An obvious reason for removing the dust from blast furnace gas is to avoid the fouling of mains and consuming apparatus. Furthermore, it is almost invariably economical to recover the metallic values in the dust. Water vapor is an apparent liability because it adds to the quantity of combustion products, and so impairs the heating value of the gas. The quantity of water vapor in top gas is such that the dewpoint is about 110 F. If the gas is cooled to about 90 F, about half of the water vapor is condensed, and there is an opportunity to get rid of it. Most blast furnace gas cleaning today is by the wet process, involving the copious application of water. Required degrees of cleanliness are indicated for boilers, hot blast stoves, soaking pits, coke ovens, and gas engines. The controversy between hot-dry cleaning and cold-wet cleaning is reviewed. Dry cleaning methods include dust catchers, whirlers, precipitators, and bag houses, The history of wet cleaning is summarized. Moisture elimanators, the Peabody washer, ball washers, and the principle of wetting the dust particles by causing water vapor to condense upon them are considered. Secondary wet cleaning with the Thiesen disintegrator and wet-type precipitators is described. The cost of gas cleaning is discussed, as well as sludge removal by settling basins, Dorr thickener, reclaimed water, or tray thickeners. The influence of furnace conditions upon the degree of gas cleaning is mentioned, including ferromanganese gas cleaning.

21253
APTIC NO. 40773

Richardson, H. L.

SCOPE OF THE FURNACE FUME CONTROL PROBLEM. *Iron Steel Engr., vol. 33:105-111, Jan. 1956, 3 refs.*

Less than 10% of the tonnage of total material produced in a steel mill is the saleable product; over 90% of the weight of this tonnage in the conventional mill is by-product and waste gases. Historically, gas cleaning was first applied to recover materials of value. The second requirement was the cleaning of by-product gases to enhance their economic value. The third and final phase is the one which now holds the greatest interest--the reduction of air pollution. Today, many areas demand the regulation of the weight of suspensoids which are discharged in a given measure of gas, such as grains per cubic foot or pounds per thousand pounds of gas. This is no measure of the visual appearance, or the light scattering power of a stack emission. A recently developed method of evaluating quantities of light-scattering solids in such a manner that their opacity can be measured by an instrument is described. Basically, there are five different types of gas cleaning equipment available: settling chambers, filters, scrubbers, inertial collectors, and electrical precipitators. Operations in the steel industry which present pollution problems are indicated, as well as the relevant control measures.

21254
APTIC NO. 40308

Riha, K.

THE INFLUENCE OF OXYGEN CONCENTRATION IN THE LANCING MIXTURE ON THE RATE OF EVOLUTION OF BROWN FUMES IN THE INTENSIFIED OPEN-HEARTH PROCESS. *Hutnik (Prague), 19(6):210-213, 1969. 11 refs. Translated from Czech. British Iron and Steel Industry Translation Service, London (England), 14p., June 1970.*

The effect of the oxygen concentration in the gas mixture blown into the metal bath of an open-hearth furnace on the intensity of brown-fume generation is examined. Brown-fumes in open-hearth steel making consist of dust containing a large proportion of iron. When the oxygen content of the gas used for oxygen-blowing was reduced from 95 to 85%, the out put of brown fume decreased by 4.5%. Further reduction of the oxygen control of time gas could further reduce the brown fume, but the decrease in furnace out put would cancel the advantages of using oxygen blowing.

21255
APTIC NO 40350

Rikhter, L. A. and Yu. K. Dobrynin

COMPUTATION OF OPTIMUM GAS FLOW RATES IN THE CYLINDRICAL PORTIONS OF STACKS. *(Raschet na ETsVM optimalnoy skorosti gazov v tsilindricheskikh stvolakh dymovykh trub). Text in Russian. Izv. Vysshikh. Uchebn. Zavedenii, Energ. (Minsk), 14(3):64-68, March 1971. 3 refs.*

The gas flow rates within the cylindrical body of stacks constitute the determining factor in their design and construction costs. Increased diameters lead to increased financial investments but allow decreased yearly expenditures. A method for the calculation of optimum gas flow rates by a computer is presented. Computation allows the determination of the required amount of variables as affected by any of the involved parameters. Selection of optimum gas flow rates achieves considerable savings in terms of design and construction costs of stacks, when applied to thermal power plants, where multiple stacks are considered to be the only means for the abatement of sulfur dioxide emissions. Included is a sketch of a 320 m. high triple stack and an example of computation of its main design criteria, according to the presented method.

21256 APTIC NO. 40276

Roberts, R. M. and R. C. Hanson

COMBINED FIRING SYSTEMS FOR SPECIFIC METROPOLITAN AREAS. (FINAL REPORT). *Aerojet-General Corp., El Monte, Calif., Envirogenics Co., Environmental Protection Agency Contract EHSD 71-9, Rept. F-0303, Rept. APTD-0951, 132p., Nov. 1971. 6 refs*

NTIS: PB 207701

The purpose of the present study was to develop for Philadelphia and Cleveland design recommendations and procedures for the disposal of refuse, a low sulfur fuel, with heat recovery in utility grade boilers. Optimal system design configurations were identified and the benefits to the environment and the economy quantified, and knowledge was applied to specific case study areas. Arrangements with two cities having high sulfur dioxide burdens and growing solid waste burdens were made. Information required for the study was collected and analyzed. Specific design packages were then developed for each city. Contained therein are projections describing the future nature of the city refuse-fuel inventories, specific recommendations as to plant types, sizes, and sites, cost analyses of operations involving the utilization of such systems, and estimated reduction in SO2 and particulate emissions. The systems recommended would be more cost-effective than the methods that are now in use. The refuse would be used to produce electricity and heat.

21257 APTIC NO. 39894

Robinson, K. E.

POLLUTION AND CONTROLS IN INDUSTRY. *Am. Ind. Hyg. Assoc. Quart., 11(1):64-72, March 1950.*

There are four important considerations in every air pollution problem: selection of a suitable control method or collector; the initial cost of the equipment and installation; equipment maintenance; and disposal of collected material. The importance of these factors is demonstrated by nine case histories involving such problems as odors, dusts, vapors, and fly ash. Specific emission sources covered are a power plant, a rendering plant, a phthalic anhydride plant, a calcium carbide plant, a pharmaceutical plant, a plant manufacturing asphaltic base coatings, an oil and grease company, an iso-valeric acid plant, and a chemical fertilizer plant.

21258 APTIC NO. 40049

Rosendahl, Fritz

RECTISOL AND PURISOL. *(Rectisol und Purisol). Text in German. Gas Wasserfach, Gas Erdgas (Munich), 113(1):33-34, Jan. 1972. 3 refs.*

The Rectisol process removes hydrogen sulfide and carbon dioxide from gases. Methanol is used as scrubbing agent. The process takes place under pressure. The Purisol process serves the same purpose but uses N-methylpyrrolidon as a scrubbing fluid. It also operates under pressure. Both methods are based on the absorption and desorption of the gas pollutants. The scrubbing fluid is regenerated solely by pressure release. Both processes operate at low temperatures. The two scrubbing fluids used by the two processes are non-foaming and can be easily mixed with water at any ratio. The solvent/water mixture can be separated by simple distillation. Both scrubbing fluids are thermally and chemically very stable and non-corrosive so that simple steel can be used as material for the equipment. Both scrubbing fluids are easily available in any quantity.

21259 APTIC NO. 39792

Ruff, R. J.

CATALYTIC COMBUSTION OF HYDROCARBON VAPORS. *Interdepartmental Committee on Air Pollution, Washington, D. C., Air Pollut., Proc. U. S. Tech. Conf., Washington, D. C., 1950, p. 259-263. (May 3-5, Louis C. McCabe, ed.)*

A recently developed catalytic method of fume incineration permits effective oxidation of hydrocarbon vapors at reasonable cost, provided that the fumes are substantially free of unburnable solids and that metals such as mercury and zinc, which will deactivate the catalyst, are not present. The catalyst, in the form of a metallic filter mat, is constructed to provide a high surface exposure, turbulence in passage through the element, and reasonable minimum resistance to flow. Sustained discharge temperatures above 1200 F are permissible without damage to the catalyst. Of the units operating to date, none have become deactivated until about 4000 hr of service. Reactivation is possible at reasonable cost. The principles of operation and details of use with various types of ovens and furnaces are explained. Applications include rendering and surface coating operations, solvent evaporation processes, coffee roasting, chemical processing plastics manufacturing, and paper printing and varnishing.

21260 APTIC NO. 40267

Salooja, K. C.

CONTROL OF NITROGEN OXIDE EMISSIONS FROM COMBUSTION SOURCES: PART II, MOBILE SOURCES. *J. Fuel Heat Technol., 19(2):7, March 1972. 28 refs.*

Techniques for the control of nitrogen oxide emissions from gasoline and diesel engine exhausts are reviewed. Control through changes in combustion conditions can be effected either by modifying the engine operating variables or by incorporating auxiliary means. Since any method which reduces NOx can adversely affect the emission of carbon monoxide and hydrocarbons, in practice a combination of techniques is used to provide optimum control. The major variables for control of NOx emissions are air-fuel ratio and spark timing. Auxiliary means for modifying combustion conditions are exhaust gas recirculation and water injection. Catalytic destruction of NOx in the exhaust gas may supplement combustion controls. Thermal reactors and catalytic converters are also considered for simultaneous controls of NOx, CO, and HC. Current and projected emission and operating criteria, emission data for unmodified internal combustion engines, and effects of injection timing on engine operation and emissions are discussed. The techniques most suitable for NOx control in diesel engines are modification of injection timing, exhaust gas recirculation, and water injection. Some general trends in automotive emission control development are considered.

21261 APTIC NO. 40694

Sawada, Hisashi

MUFFLER CUTTER. *(Mafura katta). Text in Japanese. (Japan Radiator Co., Ltd., Tokyo) Japan. Pat. Sho 47-2990. 2p. Feb. 1, 1972. (Appl. Dec. 2, 1969, 1 claim).*

This muffler cutter is designed to abate noise and to simplify manufacturing. A funnel shaped amplifier is connected with the exhaust pipe. Two branch mufflers are welded into the funnel shaped amplifier, but only partially, by two incisions made on the pipes. Part of the pipes are left open, letting the outside air go through freely. Part of the opening between the muffler pipes and the amplifier is closed off by a partition, allowing only a portion of exhaust gas to go out at a time.

21262 APTIC NO. 40272

Schuett, E. and H. Meier zu Koecker

WASTE AIR CLEANING BY THERMAL AND CATALYTIC AFTERBURNING. *(Abluftreinigung durch thermische und katalytische nachverbrennung). Text in German. Preprint, Technische Univ. Berlin (West Germany), Inst. fuer Brennstofftechnik, 30p., 1972. 6 refs. (Presented at the Seminar Abluft und Abluftreinigung, Technische Akademie, Wuppertal, West Germany April 17, 1972.)*

The rapidly increasing developments in the field of afterburning made a coordination of the terms and a standardization of the definitions necessary. For this purpose the VDI guidelines 2441 (catalytic afterburning) and 2442 (thermal afterburning) are being drafted. Catalytic afterburning takes place at temperatures of 300 to 500 C, thermal afterburning between 500 and 900 C. The reaction during the catalytic process takes place on the surface of a porous catalyst, during thermal afterburning in a reaction chamber. A survey and discussion of the most important parameters such as reaction speed, degree of conversion, and volume charge is given. The term volume charge is discussed with the aid of practical data. The relationship between combustion chamber load and the average residence time is of importance here. After the thermal combustion without flame, the combustion with a flame is dealt with. The degree of conversion is determined by the mean reaction speed which in turn is influenced by the combustion chamber temperature. Combustion chamber volume and flame volume or flame length are parameters which are determined by the degree of conversion and by the reaction speed. Reactions in the preheater, as well as the carbon monoxide and nitrogen oxides formation in the reactor, are problems of thermal combustion. A further major problem is the mixing of the waste gases with the flame. After a discussion of the principle of the catalytic combustion, the temperature and concentration characteristics on an adiabatic catalyst layer, as well as the term ignition temperature, are discussed. For the efficiency of a catalyst its activity is decisive. It is reduced by contamination. The possible power gain is of importance for the economic operation of a catalytic combustor. The heating value of the gas must be known in order to determine the extent of power produced.

21263 APTIC NO. 40440

Schuster, Ray

THE GROWING PRESENCE OF GAS TURBINE COMBINED CYCLES. *Power Eng., 76(1):28-34, Jan. 1972.*

Although no statistical proof of combined cycle intentions on the part of electric utilities exists today, several units have been purchased, more are being contemplated, and many utilities are pursuing long-range generation plans in which combined cycle plants may play a significant role. Much of the impetus is coming from equipment manufacturers, who are actively promoting combined cycle gas turbine installations in various degrees of packaging. Various systems are described. The resistance to these systems is based upon the deteriorating fossil fuel picture. However, natural gas may not be available in some areas before the end of the century, and experience in burning the low-grade heavier oils in both gas turbines and the supplementary firing systems of the heat recovery boilers is lacking.

21264 APTIC NO. 40400

Schwanecke, R.

WILL OIL DESULFURIZATION SOLVE THE PROBLEM OF SULFUR DIOXIDE AIR POLLUTION? (Wird das Schwefeldioxid-Problem der Luftreinhaltung durch Entschwefelung des Heizoeles geloest)? Text in German. Luftverunreinigung, 1971:12-16, Dec. 1971.

About 20-45% of the total sulfur dioxide emission of 5 millions tons in West Germany in 1967 was caused by domestic heating, and petroleum products accounted for about 34%. The sulfur content of diesel and light oils is 0.4-0.8% by weight. Three different processes for oil desulfurization are reviewed. The Red-Isomax process (Universal Oil Products Co.), operating at 15 atm and 300 C temperature, delivers low-sulfur fuel oils, gasoline and Diesel oil. The RDS-Isomax process (Chevron Research Co.), using pressures of 10-12 atm at 180-220 C, provides 75% decrease in sulfur content. The first plant to apply this process is being planned. The HSD process (Gulf Research and Development Co.) applies temperatures of 400-460 C at 34-200 atm pressure. A plant in Japan, based on this process, produces oil with a sulfur content of 0.98% by weight. The processes presently available provide maximum sulfur contents of 1% in heavy oils and 0.1-0.2% in light fuel oils and diesel oil at a cost of about 1/4-1/2 cents/l. In addition, both nitrogen and heavy metal content and viscosity are reduced by desulfurization. By using light and diesel oils with a maximum of 0.2%, and heavy oils of 1% of S, the sulfur dioxide emission from oil firing would decrease from 3 million t/yr to some 0.75 million t/yr.

21265 APTIC NO. 40606

Seaver, J. J.

AIR POLLUTION AND REMEDIES. *Iron Steel Engr., 39(10):94-95, Oct. 1953.*

Man-made air pollution is more subject to amelioration than natural pollution since both cause and remedy can be controlled. Paving of streets and highways, control of sulfur odors and steam from hot slag granulating pits, release of industrial effluents through high stacks, and improved combustion management to achieve complete combustion are noted. Open hearth and blast furnaces are major sources of air pollution in the iron and steel industry. The combustion system in open hearth furnaces could be improved by installing multiple individual burners in place of the single one in each end of the furnace. The use of refractory deflectors to help remove the products of combustion in these furnaces is diagrammed.

21266 APTIC NO. 40197

Sefcik, A. J., D. E. Lyons, and W. O. Williams

DEVELOPMENT, DESIGN AND OPERATION OF A CONTROLLED-CIRCULATION FUME HOOD FOR BASIC OXYGEN FURNACES. *Iron Steel Engr., 42(7): 87-93, July 1965.*

Development laboratory facilities were used to conduct tests on both smoke-table and water-table models, thus providing qualitative data for a better understanding of gas flow characteristics found in the various fume hood configurations. This information provided a basis for the initial determination of how and where in the hood carbon monoxide gas and air mix to form a combustible mixture. Results of this laboratory work were fed into an existing furnace analysis computer program, and various absorption profiles were developed for expected operating conditions. The water system, gas system, and operating history of an oxygen steelmaking process are described. The welded wall fume hood -- high pressure water or steam cooled -- can reliably handle the burden imposed by the converter without introducing problems alien to normal oxygen steelmaking.

21267 APTIC NO. 40729

Seki, Toshihiko, Hidehiko Hoshikawa, Morio Suzuki, and Tadashi Kanno

ON THE CONTROLING EFFECT OF CO IN THE AUTOMOBILE EXHAUST GAS BY SLOW ADJUSTMENT WITH AUTOMOBILE EXHAUST GAS TESTER. *(Jidoshahaikigasu Tester o mochiita suro-chosei ni yoru judosha haikigasuchu no CO jyokyokoka ni tsuite). Text in Japanese. Sendai-shi Eisei Kenkyusho Ho (Proc. Inst. Pub. Health, Sendai City), no. 2:172-190, 1971. 6 refs.*

As a plan for controling automobile exhaust gases, a carbon monoxide elimination experiment was carried out by the way of slow adjustment with an exhaust gas tester and engine tachometer. The slow adjustment uses the carburetor in a condition of an idling engine, putting the pipe of the tester into the muffler. With gasoline, kerosene, liquefied petroleum gas, and diesels, CO concentration in the exhaust gases were determined. Gasoline cars (79) had CO concentration of 0.2 to 12% or more (average 5.7%) before the slow adjustment, and 60 of the cars had more than 3%. With the slow adjustment, these 60 cars had a decrease not exceeding 3%. Eighteen special kerosene cars had 2.3-8.9% CO, of which less than 3% amounted to 11% of the whole, and less than 5.5% corresponded 55.6%. The 32 LPG cars had 0.1-11.0% CO, of which less than 3% amounted to 43.8% of the whole, and less than 5.5% to 68.7%, and less than 1.5% to 28.1%. In diesels the CO was detected in a small amount in 5 of 59 cars, and it was only 0.2%.

21268 APTIC NO. 40680

Serruys, Max

CAN A BETTER COMBUSTION REMEDY THE ATMOSPHERIC POLLUTION DUE TO PETROL-DRIVER CARS? (Une meilleure combustion peut-elle remedier a la pollution atmospherique par les voitures a essence?) Text in French. Pollut. Atmos. (Paris), 14(53):17-27, Jan.-March 1972. (Presented at the Colloquium of the Combustion Institute, Lille, France, Sept. 9, 1971.)

Theoretical and actual combustion conditions in internal combustion engines, as well as a simple procedure for the simultaneous reduction of the carbon monoxide, nitric oxide, and hydrocarbons in the exhaust gas from a Renault R 16 model car are described. The composition of the exhaust gas is influenced by factors such as the homogeneity of the mixture, the distribution of the residual burned gases in the mixture, the geometry of the combustion chamber, the chamber wall temperature, and the turbulence conditions inside the chamber. By applying secondary air automatic control, combined with an automatic servo control to provide maximum possible homogeneity and best low excess air adjustment in all load ranges, as well as to prevent the choke from closing fully to avoid ignition troubles, it was possible to reduce simultaneously the carbon monoxide content to 0.6%, the hydrocarbon content to 178 ppm, corresponding to 27.6% of the original concentration, and the nitric oxide content to about 70 ppm. At the same time, the fuel consumption decreased by about 10%. It is possible to reduce further the CO, NO, and HC 0.5%, 700 ppm and about 125-130 ppm, respectively.

21269 APTIC NO. 39791

Severance, H. D.

CONTROL OF CANNERY ODORS AT MONTEREY. *Sewage Works J., 4(1):152-155, Jan. 1932. (Presented at the California Sewage Works Association, Annual Meeting, 4th, Monterey, Calif., Sept. 22, 1931.)*

The control of odors from ten sardine canneries in Monterey, California was discussed. Ordinances are mentioned. After 30 yrs of trial and error, it was concluded that there is an economic impossibility of operating fish canneries which will not carry at least a fishy odor in and about them. But the use of rotary dryers to load the atmosphere with nauseous gases was unnecessary. Odorless drying equipment was installed at one cannery consisting of steam jacketed batch dryers. The dryers have horizontal cylinders with a central longitudinal shaft for operating paddles which lift and stir the meal. The steam jacket heats the meal and evaporates the contained moisture, which is drawn off through a condenser under about two inches of vacuum. Another odorless process is the Peebles process, which involves the use of superheated steam at about 600 F driven through a rotary dryer. The water-laden vapor discharged at the outlet end of the dryer is passed through a condenser which removes the water absorbed from the meal. It then passes through the heater, where it is boosted again to 600 F, and again passes on its way to the dryer. After reaching the dryer, the gases are scrubbed which eliminates 90% of the odor.

21270 APTIC NO. 40066

Seya, Yutaka

EXHAUST GAS (SO2), (2) DESIGNING OF HIGH CHIMNEY STACK. *(Haigasu (SO2), (2) Koentotsu no sekkei). Text in Japanese. Karyoku Hatsuden (Thermoelectric Power Generation), 23(3):261-279, March 1972.*

The building of steel and ferro-concrete stacks or chimneys (130 m or higher) is fully discussed. Various external forces can affect the stack or chimney and should be taken into account in designing, such as wind pressure and its estimated load, average wind velocity, maximum average wind velocity, momentary maximum wind velocity, gradual increase of wind velocity with higher altitude, and estimation of wind load for steel tower or tube. The Double-Warren-type frame structure is the best suited for a stack. The stack tube should stick out 6 m above the top end of the steel tower to prevent downwash effect. Deflection of the steel tower should be 1/150 or less. With a collective stack consisting of a stack tube and a supporting steel tower, all the horizontal forces such as wind and quakes should be borne by the tower alone. The supporting point of the supporter for the tube should be a structure to permit expansion and contraction of the tube according to temperature. The joint of the tube and that of the main structure frame of the tower (800 mm or bigger) should be welded. The intra-tube lining must be vibration-, acid- and heat-resistant. An elevator to facilitate inspection and maintenance should be installed if the stack is 150 m or higher. As to the selection of materials, the Table of Allowable Stress is shown for reference. Several formulas for estimation of the vibration characteristics of a steel tower are also presented. Construction methods for steel tube stack briefly discussed include P and H, Center Post, Side Tower methods while those for steel tower type stacks include Erector, Corner Erector, Center Derrick, Craning, Temporary Tower, and Jack-up methods. Designing and construction of a ferro-concrete chimney are also discussed in the similar manner. The sulfur content of fuel affecting the internal lining is also mentioned.

21271 APTIC NO. 39998

Shimizu, Ryosaku

ESSAY ON THE CONSERVATION OF RESOURCES FOR THE PURPOSE OF THE PREVENTION AGAINST THE ENVIRONMENTAL POLLUTION. *Oyo Butsuri (Tokyo), 40(11):1191-1202, Nov. 1971. 9 refs.*

At the present time, waste disposal, as well as air, river, and sea pollution are becoming an urgent problem in our national life. Modern industrial development accompanied with mass production and consumption has brought about environmental pollution by wastes. There is no way of solving such a problem besides collection, re-use, and re-utilization of wastes. Re-utilization of wastes, as well as acceleration of artificial recirculation have the possibility of minimizing the increase of entropy, preventing environmental pollution, establishing harmony between the nature and the artificialities, and keeping the increase in consumption and production.

21272 APTIC NO. 40007

Shishkov, D., D. Ivanov, and G. Radoeva

DTA STUDY OF A LOW-TEMPERATURE CATALYST FOR CARBON MONOXIDE CONVERSION. *J. Appl. Chem. (USSR) (English translation from Russian of Zh. Prikl. Khim.), 44(9):1980-1983, April 1972. 8 refs.*

The kinetics of reduction of low-temperature catalysts (containing copper chromate and cupric oxide) for carbon monoxide conversion were investigated by differential analysis. Reduction by hydrogen and carbon monoxide proceeded in two stages as determined by analysis of the carbon dioxide evolved. Rates of reduction of the catalysts at low temperature are considerably higher with CO than with hydrogen. This permits the use of lower temperatures, diminishing the danger of overheating the catalyst.

21273 APTIC NO. 40465

Siepmann R. and K. Reith

CATALYTIC EXHAUST GAS PURIFIERS FOR SMALL PLANTS. *(Katalytischer Abgasreiniger fuer Kleinanlagen). Text in German. Wasser Luft Betrieb, 16(5):142-143, May 1972.*

Exhaust gases containing organic pollutants are now mostly cleaned by catalytic or thermal afterburning. At larger waste gas quantities the economical operation of such afterburners depends on the heat recovery and its re-use. For waste gas quantities of up to few thousand cu m/hr, heat recovery is no longer economical. A rather simple design of the afterburner is feasible in such cases. A catalytic afterburner consisting of a cylindrical container which conically widens on top is described. It comes in three sizes with capacities to 250, 500, and 1000 cu m/hr. The waste air which enters the afterburner is heated by means of a burner fired with city gas, natural gas, liquid gas, or fuel oil. A guide vane imparts a rotary movement on the waste gas flow and mixes it with the hot gases from the burner. Next the gas flow passes the catalyst and is burned to harmless CO2 and water. The afterburner is made of stainless steel for avoidance of corrosion. A honeycomb catalyst is used instead of the conventional pellets or spheres. The afterburner has been successfully used in a meat curing plant, at drying stations for food, and at lacquering stations. An average collection efficiency of 99.7% could be achieved.

21274 APTIC NO. 39900

Silex, Klaus

THE COMPLEX SOCIALIST RATIONALIZATION FOR THE IMPROVEMENT OF ENVIRONMENTAL CONDITIONS (DUST AND NOISE CONTROL). *(Die komplexe sozialistische Rationalisierung im Blickpunkt der Verbesserung der Umweltbedingungen (Staub- und Laermbekaempfung)). Text in German. Giessereitechnik, 14(8):245-251, Aug. 1968. 14 refs. (Presented at the 15-Jahre ZIG Symposium, Leipzig, East Germany, March 20-21, 1968).*

The control of non-toxic dusts (possibly containing quartz, cristobalite, and tridymite), and of noise generated by foundries is analyzed from the viewpoint of socialist rationalization. Foundry dust causes silicosis, silico-tuberculosis, and metal poisoning manifested by shortness of breath and heart impairment, enlargement, and failure. Health impairment from noise does not produce permanent damage until after a number of years of exposure, when it is manifested by increased irritability, impaired respiration, central nervous system damage, sleeplessness, and nausea. The incidence of silicosis in foundries has decreased somewhat in recent years but is still alarming. Effective control involves a reduction of the particle count in ambient air to 500 particles/cu m when the free Si02 content of the dust does not exceed 10%. Dust concentration can be determined by a konimeter which registers only harmful particle sizes, i.e., five micron or smaller. To conform with current legislation, several foundries have been equipped with wet dust separators -- cyclones are used only as preseparators; new plants are air-conditioned. The most effective dust control measure is complete enclosure of dust-generating equipment and removal of the polluted air by suction. Noise control can be accomplished by reduced noise generation, organizational measures, attenuation of noise propagation, and by individual protection against noise. Organizational measures include the space and time-related conglomeration of noise sources of equal intensity, because while two sources of like intensity increase the noise level by 3 decibels, 10 sources of like intensity increase the noise level only 10 decibels above the noise level of a single source. Mechanization by itself represents a control measure because fewer workers are exposed to dust and because reduced physical exertion lessens the inspired number of dust particles. The average noise control expenditure amounts to about $50 per worker and is justified if the noise level is thereby reduced by more than 3 decibels. Other pollutants emitted by foundries are sulfur dioxide and fluorides from cupola ovens, and formaldehyde, phenol, and carbon monoxide from resins used as sand binding agents in mold making.

21275 APTIC NO. 39971

Silverman, Leslie

TECHNICAL ASPECTS OF HIGH TEMPERATURE GAS CLEANING FOR STEEL MAKING PROCESSES. *Air Repair, 4(4):189-196, 231, Feb. 1955. 12 refs. (Presented at the Air Pollution Control Association, East Central Section Meeting, Youngstown, Ohio, Sept. 23, 1954.)*

High temperature gas cleaning in both steel or ferro alloy processes is difficult because it is usually associated with extremely fine particles dispersed in gases at temperatures in the vicinity of 500-1500 F. Basic problems include economics and fundamental requirements for cleaning. The major steel-making processes in terms of sources of pollution and operations which require some control are blast furnaces, converters, sintering plants, open hearth furnaces, and electric furnaces. Operating variables, control methods, and the gaseous effluent from each of these operations are discussed. Requirements for cleaning effluent gases and the present methods of hot gas cleaning are indicated. Visibility is mentioned. Cleaner location is discussed. Inertial cleaners, wet cleaners, filtration units, and electrostatic precipitators are described. The research program at Harvard on methods of controlling and removing effluent fumes resulting from open hearth and steel manufacturing operations is discussed.

21276 APTIC NO. 40754

Silverman, Leslie and Robert A. Davidson

ELECTRIC FURNACE FERROSILICON FUME COLLECTION. *J. Air Pollution Control Assoc., 6(1):21-28, 48, May 1956). 3 refs. (Also J. Metals, vol. 7:1327-1335, Dec. 1955).*

In correlation with studies on stack concentrations and volume of material evolved during electric ferroalloy furnace operations and the physical and chemical nature of the collected fume, wet and dry fume collector efficiency and applicability were examined. A dry collection unit utilizing the reverse-pit principle was superior to a number of wet collection units. Performance efficiencies of 99% were obtained with two kinds of air pretreatment (air dilution or spray cooling) or through use of a high temperature resistant filter medium. The maximum capacities were: air dilution, 15 cfm/sq ft of fog: spray cooling, 9.5 cfm/ sq ft of cloth; and Orlon-Fiber glass quilted filter (no auxiliary cooling), 7.4 cfm/sq ft of cloth area. The best efficiency with wet collection units was 70%. (Author summary modified)

21277 APTIC NO. 39970

Specht, S. E. and R. W. Sickles

NEW USES OF ELECTRICAL PRECIPITATION FOR CONTROL OF ATMOSPHERIC POLLUTION. *Air Repair, 4(3):137-140, 170, Nov. 1954.*

The application of electrical precipitators for the removal of fly ash from central power stations boiler effluent is reviewed. New applications are discussed including the cleaning of ferromanganese blast furnace gas, open hearth precipitators, the recovery of dust from the combustion gases from iron ore sintering machines, cupola installations, and the recovery of dust from cement processing. Design criteria for these applications are considered. A precipitator consists of a shell in which are grouped two sets of electrodes; one, plates or pipes known as collecting electrodes, and the other, wires or rods designated as discharge electrodes. The latter are located in the center of ducts formed by the collecting electrodes in the case of the plate type precipitator, and in the center of the pipes in the case of the pipe type precipitator. A high voltage, unidirectional difference of potential is impressed across the two sets of electrodes which ionizes the gas, imparts a charge on the particles, and precipitates them on the electrode of opposite polarity.

21278 APTIC NO. 40266

Speight, G. E.

AIR POLLUTION CONTROL IN IRON AND STEEL INDUSTRY. *J. Fuel Heat Technol., 19(2):20-23, March 1972. (Presented at the International Air Pollution Control and Noise Abatement Conference, Jonkoping, Sweden, Sept. 1-7, 1971.)*

The operating principles and adaptation of various control techniques within the iron and steel industry are examined. The major emissions and sources within the industry include grit, dust, and sulfur dioxide emitted during sintering in the blast furnace; particulates, smokes, and gases (carbon monoxide, ammonia, SO2, hydrocarbons, and organic compounds) from coking plant operations; grit and drizzle from hot coke quenching; carbon monoxide, iron ore, sinter, and coke particles from blast furnaces; iron oxide fumes and smokes in the steelmaking process; sulfur dioxide, dusts, and fumes from open hearth furnaces; basic oxygen furnaces; and electric arc furnaces. Cleaning and control processes and equipment for these processes include electrostatic precipitators, low sulfur fuels, higher stacks for greater dispersion, temperature control, hoods, shroud exhaust systems, cyclones, dust collectors, flares, good maintenance, wet scrubbers, baffles, gas washing towers, bag filters, rapping mechanisms, exhaust fans, and process modifications.

21279 APTIC NO. 40948

Starkman, Ernest H.

POLLUTION CONTROL BUDS AT GM. *Ind. Week, 173(5):28-32, May 1, 1972.*

Modifying processes and the materials going into them are an important part of General Motors approach to air pollution control in its plants. General Motors is trying both to develop new solvents and also to develop a dry powder substitute for wet paint which will eliminate the solvent entirely. Similarly, air pollution requirements are being met in GM foundries by modifications in production processes. Cupolas at Saginaw, Michigan, are being converted to induction furnaces so that the problem is about 90% eliminated just by not using coal. A program is being worked on to obtain a full-scale demonstration system of a totally conserved water process. With regard to the automobile, it is suggested that emission requirements are exaggerated. The question has never been whether there should be controls, but it has always been at what level should controls be established to achieve the best balance between appropriate environmental protection and the resulting impact on our national economy and our natural resources.

21280 APTIC NO. 40220

Steel, W. R.

ECONOMICAL UTILIZATION OF CAUSTIC SODA IN COTTON BLEACHERIES. *Am. Dyestuff Reptr., 51(1):29-30, Jan. 8, 1962. (Presented at the American Association of Textile Chemists and Colorists, National Convention, Buffalo, N. Y., Sept. 28, 1961.)*

In many cotton bleacheries, a major portion of the purchased caustic soda (sodium hydroxide) is wasted. If the caustic content of the used liquor is not too low, it can be evaporated purified, and reused, thereby reducing costs and alleviating air and stream pollution. A caustic utilization survey should first be made by analyzing a caustic-consuming operation to determine the quanity of caustic consumed, available for recovery, recovered, reused, and wasted. The survey report should include a complete cost evaluation. Procedures are available for increasing the quantity and concentration of the recovered liquor to permit reusage of the maximum amount as is, thus minimizing reconditioning costs. Impurities are concentrated during evaporation and therefore filtration is usually necessary. In some cases dialysis may be required to reduce soluble impurity content. Recovery and reutilization of caustic soda usually reduces the causticity of bleachery waste, but sometimes not enough odor. While economic utilization of caustic soda can involve recovery, evaporation, filtration, dialysis, and flue gas treatment of the final waste, the annual return on investment commonly exceed 50%. (Author abstract modified)

21281 APTIC NO. 40717

Stuckey, A. Nelson, Bert T. Fant, John H. Duir, and G. A. Mickelson

OPERATING VGO DESULFURIZATION UNIT AT LOW PRESSURE CAN HELP CUT COSTS. *Oil Gas J., 70(1):63-66, May 22, 1972. (Presented at the American Petroleum Institute, Division of Refining, Midyear Meeting, 37th.)*

Research and engineering studies have continued to improve the Go-Fining hydrodesulfurization process, which accounts for 46% of the free world vacuum-gas-oil (VGO) desulfurization capacity. One significant advance is commercialization of a low pressure Go-Fining unit, operating at 500 psig. Operation at lower pressures reduces hydrogen consumption, a major item in VGO desulfurization. Important hydrogen-consumption savings have been shown in pilot plant operations on a number of feedstocks at the lower hydrogen partial pressures. The commercial unit started up smoothly and operability has been excellent. Catalyst deactivation has been negligible even though the actual feed is considerably heavier than design. Low pressure Go-Fining approaches the conditions used in mid-distillate hydrotreaters. A combination of mid-distillate and VGO desulfurization in a single operation is suggested as a means to further reduce costs.

21282 APTIC NO. 39904

Sussman, Victor H.

AIR POLLUTION AND ITS CONTROL IN THE STEEL INDUSTRY. *Iron Steel Engr., 39(5):80-84, May 1962. 5 refs.*

Production of one ton of steel requires the use of over 10 tons of air. Blast furnace production of one ton of iron results in 0.6 tons of slag, 0.1 tons flue dust, 5.1 tons gas, and occasional mushroom clouds from furnace slips. Size and power requirements of air cleaning systems present major economic considerations. Regulatory requirement vary depending upon population density, meteorological conditions, and topography. Gas cleaning equipment consists of a wet scrubber and an electrical precipitator. It is impractical to provide gas cleaning equipment for the large volumes of dust-laden gas discharged periodically as the result of blast furnace slips. Hydrogen sulfide gas emanating from slag quenching pits presents an offensive odor in nearby communities. Recent modifications in blast furnace operations such as the injection of fuel oil have contributed to air pollution. The by-product coke oven releases contaminants during charging, coking, pushing, and quenching. Sintering plants are equipped with collectors and electrical precipitators. In open hearth operations, variations in dust loadings and gas discharge rates complicate the economic design of collectors. Electrical precipitators clean gases with 98% efficiency, cleaning 700,000 cu ft/min and discharging gas with a loading not over 0.05 grains/cu ft. Filtration methods for cleaning open hearth gases are being studied by Harvard School of Public Health. Air pollution problems associated with the Bessemer converter are similar to those of the blast furnace and open hearth. The control of sulfur and other noxious gases emitted during coal burning operations is being studied by the Bureau of Mines and other groups. Because air pollution control is relatively new, standards for control equipment and emission standards are incomplete. Plant management should accept responsibility for air pollution control and make positive provisions for control devices in new construction.

21283 APTIC NO. 40496

Takemura, Eiji and Osamu Takamori

WASTE GAS RECOVERY METHOD FOR OXYGEN UP-DRAFT CONVERTER. *(Sanso uwabuki tenro no haigasu kaishuho). Text in Japanese. (Nippon Steel Corp. (Japan)) Japan. Pat. Sho 47-6005. 3p., Feb. 21, 1972. (Appl. Oct. 3, 1968, 1 claim).*

Waste or exhaust gas from an oxygen up-draft converter contains a lot of carbon monoxide, a useful material that can be recovered as a fuel or chemical material. In the conventional recovery method, the gas is first led to a heat exchanger where it is cooled from the initial 1500-1600 C to 1100-1200 C, and then led to a cooling column where it is cooled to about 100 C with spray water. After that, the gas is led into the first dust remover, where it is scrubbed for further cooling and removal of large-sized dust. It then goes to the second scrubber for cooling and dust removal. In the separator, water contained in the treated gas is separated, after which the gas is blown into the gas recovery system. The dust removers are either a venturi scrubber or a condenser scrubber. The venturi scrubber gives a high dust removal efficiency but is subject to greater pressure loss. The condenser type has less pressure loss and lower dust removal efficiency. This method has been devised to meet the two contradicting requirements, less pressure loss and higher dust removal efficiency. The dust remover used in this new method is a condenser type. The temperature of the waste gas is controlled to be about 60 C or lower at the exit port of the dust remover. Since the gas temperature is usually controlled at 100 C in the recovery system, it can be held at about 60 C or lower by water cooling using 10 l/n cu m or more water. This temperature range is suited for water to form waterdrops with dust as the core, thus giving higher dust removal efficiency. It is also designed so that the gas to be cooled stays in the dust remover for 25 sec or longer. If less than 25 sec, a lot of dust is found in the treated gas. But if more than 25 sec, the dust content drastically decreases.

21284 APTIC NO. 40147

Thirkell, Harry

CUT CO2 REMOVAL COSTS BY COMBINING PROCESSES. *Hydrocarbon Process., 57(1):115-118, Jan. 1972. 8 refs.*

Removal of carbon dioxide in ammonia synthesis and in gas purfication for hydrogen manufacture in refineries set process conditions beyond limits best suited to any established process. Under these conditions the use of a combination of two conventional processes can be less expensive than the use of any single process. Such a combination can reduce operating costs by as much as 10% without increasing investment costs for the installation. The combination CO2 removal system utilizes in its first stage a solution of potassium carbonate activated by diethanolamine and in its second stage a diethanolamine solution. Steam for stripping the DEA solution is also used to regenerate the K2CO3/DEA solution while heat from the spent K2CO3/DEA solution is used to preheat the spent DEA solution to the regeneration temperature.

21285 APTIC NO. 39890

Thompson, William H.

CONTROL OF PARTICULATES IN POWER GENERATION. *Tennessee Univ., Knoxville, Dept. of Civil Engineering, Proc. Ind. Air Pollut. Control Conf., Annu., 1st, Knoxville, Tenn., p. 72-93. 1 ref. (April 22-23.)*

Effective particulate collection methods currently available in coal-fired power plants are limited to either mechanical collectors or electrostatic precipitators. Both cyclones and multicyclones are relative free of temperature effects and respond well to high dust loadings, but their overall efficiency is only 60-70% due to inability to collect smaller particles. High gas temperatures and low-sulfur fuels adversely affect electrostatic precipitator performance but efficiencies in excess of 99% are obtainable. A hot precipitator designed to operate at 500-700 F is now in the development stage. This precipitator is reportedly insensitive to fuel sulfur content.

21286 APTIC NO. 40232

Thring, M. W. and R. J. Sarjant

DUST PROBLEMS OF THE IRON AND STEEL INDUSTRY. MEASURES TO STOP ATMOSPHERIC POLLUTION. *Iron Coal Trades Rev., 174(4636): 731- 735, March 29, 1957. (Presented at the Institution of Mechanical Engineers Conference, London, England, Feb. 1957.)*

Control methods to remove dust and fumes from waste gases emitted by specific processes within the iron and steel industry are reviewed. The applicability, efficiency, cost, and operation of electrostatic precipitators, venturi scrubbers, continuous slagwool filters, hoods within exhaust systems, wet scrubbers, wet impingers, bag filters, wet tower gas washers, centrigugal separation, aerodynamic separators, and overfire air jets, to control the emissions of iron oxides, manganese oxides, and silicon oxides are examined. The adaptation of the control equipment and process and design modifications are examined for the open hearth furnace, Bessemer converter, arc furnace, cupola, blast furnace, coke ovens, reheating furnaces, and small heat-treatment furnaces.

21287 APTIC NO. 40542

Trayser, D. A., J. A. Gieseke, R. D. Fischer, and F. A. Creswick

A STUDY OF THE INFLUENCE OF FUEL ATOMIZATION VAPORIZATION, AND MIXING PROCESSES ON POLLUTANT EMISSIONS FROM MOTOR VEHICLE POWER PLANTS. *Battelle Memorial Inst., Columbus, Ohio, Columbus Labs., Office of Air Programs Contract CPA 70-20, 129p., Rept. APTD-0964, Jan. 31, 1972. 13 refs.*

NTIS: PB 209476

Droplet impaction characteristics, fuel-film flow on manifold walls, and fuel vaporization were studied within the induction system phenomena to determine air-fuel mixing and distribution improvements. Ultrafine atomization, minimum manifold-passage turning angle, long passage bend radii, and low air velocity can reduce droplet impaction in an induction system. Appreciable droplet impaction still occurs, even with droplet sizes as low as 14 micron because of deposition by flow-induced air turbulence. Fuel vaporization by air preheating and by manifold surface heating is recommended in addition to improved atomization to reduce the fuel film on the wall. An improved induction system includes an air atomizing fuel nozzle operating on the ultrasonic Hartmann-whistle principle, a mixing section similar to a can type combustor, an unconventional throttle valve between the mixture generator and the intake manifold, and a single-plane manifold with a separate branch for each cylinder having equal-spaced equal-area radial entrances. Future research should include experimental studies of fuel-droplet transport and vaporization and design and development of the advanced induction system. (Author abstract modified)

21288 APTIC NO. 40723

Vernet, Daniel

POLLUTION: A MARKET FOR CHEMISTRY. *(Pollution: un marche pour la chimie). Text in French. Chim. Actualites, no. 1476:25-31, May 1972.*

The role of the chemical industry in environmental protection is outlined. The chemical industry, a chief source of pollution, is at the same time in the position to offer solutions to pollution control problems. The major contributions of the chemical industry lie in the areas of waste water treatment, waste recycling, air pollution control, and in the development of new biodegradable and photodegradable plastics. Catalysts reducing the carbon monoxide, nitrogen oxides and urburned hydrocarbons in automotive exhausts are being developed. Such catalysts should be of minimum volume, resistant to both sudden temperature changes and vibrations, and have a life of 80,000 km. Studies of chemical additives, capable of replacing lead in gasoline, are in progress.

21289 APTIC NO. 40132

Villiers-Fisher, John F. and Abe Warshaw

REMOVAL OF SULFUR DIOXIDE FROM WASTE GASES. *(Chemical Construction Corp., New York) U. S. Pat. 3,632,306. 6p., Jan. 4, 1972. 3 refs. (Appl. Feb. 18, 1969, 25 claims).*

Waste gases containing sulfur dioxide, which may also contain sulfur trioxide, are scrubbed with a aqueous slurry containing solid reactant particles of an oxide or carbonate of calcium, magnesium or barium, together with an additive containing an acidic radical which solubilizes the calcium, magnesium, or barium ion, so that the aqueous slurry absorbs sulfur dioxide from the waste gas. The dissolved sulfur dioxide forms the soluble sulfite radical in solution, which reacts with the dissolved calcium, magnesium or barium ion to precipitate a solid sulfite and regenerate the additive in solution. The solid sulfite, calcium, magnesium, or barium is separated from the aqueous liquid phase which is recycled for further scrubbing, together with makeup solid reactant particles. The scrubbed waste gas is discharged to atmosphere. This invention is particularly applicable to pollution control devices such as wet scrubbers for scrubbing flue gas, where both dust or fly ash and sulfur oxides are to be removed. This invention has several advantages. Increasing the dissolved reagent concentration permits removal of SO2 using greatly reduced contact areas and/or time. By introducing the additives, the solubility of limestone increases greatly. (Author abstract modified)

21290 APTIC NO. 39999

Vizza, Joseph

ANTIPOLLUTION CARBURETOR ATTACHMENT. *(Assignee not given.) U. S. Pat. 3,641,769. 5p., Feb. 15, 1972. 6 refs. (Appl. Jan. 16, 1970, 6 claims).*

Moisture when fed into the carburetor reduces the carbon monoxide gas emitted by the engine while simultaneously improving the gas mileage and reducing noise. A carburetor attachment is discussed for selectively feeding water vapors into the air intake of a carburetor through the conduit that contains the positive crankcase ventilation valve or directly to the exhaust pipe. The water vapor is fed from a source of heated water such as a radiator, and tanks which are heated by the exhaust pipe or the muffler from an internal combustion engine.

21291 APTIC NO. 40378

Vorotyntsev, V. M., V. A. Shvets, and V. B. Kazanskiy

EPR STUDY OF CHANGES OF COORDINATION STATE OF TETRAVALENT VANADIUM IONS ON A VANADIUM CATALYST SURFACE UPON ADSORPTION OF NH3, SO2, N2O AND N2. *(Izucheniye metodom EPR izmeneniy Koordinatsionnogo sostoyaniya ionov chetyrekhvalentnogo vanadiya na poverkhnosti vanadiyevykh katalizatorov pri adsorptsii molekul NH3, SO2, N2O i N2). Text in Russian. Kinetiki i Kataliz, 12(3):678-684, 1971. 9 refs.*

Results of electron paramagnetic resonance studies of changes in the coordination and valence state of tetravalent vanadium ions on the surface of partially regenerated vanadium-silicate and vanadium-aluminum catalysts, up on the adsorption of ammonia, nitrous oxide, sulfur dioxide, and nitrogen are described. The adsorption of the above molecules on vanadium-silicate catalysts led to the formation of surface complexes containing tetrahedrally coordinate tetravalent V ions. The adsorption of SO2 and N2 probably resulted in distorted octahedral structures, and vanadyl bonds formed between vanadium and lattice oxygen upon adsorption of ammonia. The N2O adsorption occurred without electron transfer from the V ion at -78 C, and with electron transfer and subsequent formation and stabilization in the V coordination sphere of O(-) anion radical. The coordinated, unsaturated V ions on a silica gel surface had tetrahedral coordination, while the V ions on the inside vanadium-aluminum catalysts formed vanadyl bonds. The tetrahedrally coordinated tetravalent V ions formed adsorption centers for polar and apolar molecules. The molecular anion-radicals decomposed into O(-) anion radicals at elevated temperatures. The tetravalent V ions on a vanadium-aluminum surface formed no centers for the formation and stabilization of O2(-) and O(-) anion radicals, and the adsorption of polar molecules resulted in vanadyl bonds.

21292 APTIC NO. 40358

Warnecke, A.

ASPIRATION EQUIPMENT FOR A PUMICE PREPARATION PLANT. *(Aspirationsanlage fuer ein Bimssteinaufbereitungswerk). Text in German. Aufbereitungs-Technik, no. 4:238-240, April 1972.*

Experience gained with a nozzle-type filter for dedusting pumice additives in a raw-pumice processing plant is described. The nozzle filter system MVRP-48 takes up about 150-180 N cu m air per min. This means a specific application of 4.8-5.8 N cu m aspiration air/min/sq m of the filter area. The waste air from the processing of pumice carries a high dust concentration with 80% of the dust measuring 0 to 50 micron in diameter. The high capacity of the nozzle filter system results mainly from the special design and operation of the filter system. The filter bags are cleaned by low-pressure air according to the reverse air jet principle. At nearly the speed of sound the air is suddenly pressed into the filter bag. This cleaning system permits use of a fine cloth with a high collection efficiency. Several months of practical operation have proceeded in good agreement with theoretical predictions. Measurements of residual dust concentration yielded values of about 30 mg/cu m air. Compared with the large quantities of dust-laden air to be cleaned, the dimensions of the filter are rather small.

21293 APTIC NO. 40191

Watanabe, Shoji

ON THE REDUCTION OF COMBUSTION PRODUCTS. *(Nensho seiseibutsu no teigen taisaku ni tsuite). Text in Japanese. Nensho oyobi nensyo (Combustion and Fuel), 38(10):937-944, Oct. 1971.*

General problems on the control of combustion products were discussed. Desulfurization of heavy oil has been considered to be the major way of controlling the sulfur dioxide in air. However, besides the high cost of apparatus and possible change of the properties of heavy oil, there is also aa limit on the amount of sulfur decreased. The limitation is about 1.0%. The problem of the desulfurization of the flue gas is that the concentration of SO2 is less than 0.1%, thus the application of chemical process is difficult. In order not to cause serious secondary pollution, recovery of sulfur as useful products such as ammonium sulfate or Glauber s salt is recommended. The concentration of nitrogen oxides is maximum at an air/fuel of 16, and that of carbon monoxide and hydrocarbons decrease as the ratio decreases. By controlling the air/fuel ratio, the amounts of these pollutants in exhaust gas can be decreased. Comparison of NOx concentrations in flue gases from three sources shows that coal gives the highest concentration, petroleum is second, and natural gas is third.

21294 APTIC NO. 39928

Weber, Ekkehard

FUNDAMENTALS OF DUST SEPARATION BY FABRIC FILTERS. *(Grundlagen der Staubabscheidung durch Gewebefilter). Text in German. Verfahrenstechnik, 3(7):277-281, 1969. 16 refs.*

Variables determining the efficiency of fabric filters were studied on cylindrical elementary fibers with different particle sizes and flow speeds. Diffusion was the determining factor with small particles and at low flow speeds, while the effect of inertial forces became predominant for large particles and at high flow speeds. Efficiency increased with decreasing fiber diameter. An interval of minimum efficiency was found between the ranges of predominant diffusion and predominant inertial effects. Sedimentation was of minor importance, while electrostatic charges can have undesirable effects. In experiments with quartz dust (about 95% below 0.0005 cm), minimum efficiency was found at 5.5-7.5 m/sec, while values of 97.8% and 94.9% were measured at 0.5 m/sec and 3.0 m/sec, respectively. While general tendencies and determining factors can be revealed by means of theoretical separation formulae, it is not yet possible to predetermine actual efficiency values.

21295 APTIC NO. 39795

Weber, Herbert J.

METHODS OF COMBATTING AIR POLLUTION IN FERROUS AND NON-FERROUS FOUNDRIES. *J. Air Pollution Control Assoc., 7(3):178-181, Nov. 1957. (Presented at the Air Pollution Control Association, Annual Meeting, 50th, St. Louis, Mo., June 2-6, 1957.)*

By its efforts to remove internal dust and fumes through the use of exhaust ventilation and dust-collecting systems, the castings industry became one of the foremost users of industrial dust collection equipment. During this period, the foundry industry, in conjunction with the dust control equipment industry, built up an excellent background of knowledge and experience in the techniques of effective dust and fume control within its plants. Shakeout, cleaning room, and pattern-making operations have been controlled in the foundry industry, but melting operations have presented an entirely new set of problems because of heat and corrosive gases. Operational changes are indicated as a basic step in air pollution control of hot emissions. Simple spray washers, an improved gas washer with cone, dry mechanical or centrifugal separators, high efficiency centrifugal collectors, fabric filters, and electrostatic precipitators are described to control cupola emissions. Control equipment for open-hearth furnaces is indicated, as well as methods to reduce emissions during the phosphorizing of copper and the inoculation of iron with magnesium. The carbon dioxide process for hardening cores and molds is discussed.

21296 APTIC NO. 40593

Wells, A. E.

INVESTIGATIONS OF THE GASES FROM THE DWIGHT AND LLOYD SINTERING MACHINES AT THE SELBY SMELTER. *Bull. Bureau Mines, no. 98-324-337, 503-520, 1915. 86 refs.*

Control of sulfur dioxide emissions from the sintering machines at the Selby smelter was investigated. Charges and operating conditions at the machines and gas concentrations emitted were studied to determine possible effects of variations in operation on the feasibility of by-product recovery. Under the charge and operating conditions consistent with good roasting and sintering results, 75% of the total SO2 from the machines in a gas volume with an average concentration of 7.3% SO2 was recovered. The most essential conditions to be met for these results were: The variations in the physical condition of the charges should be kept within limits that will exclude very coarse lead concentrates, coarse raw matte, and lumpy material, as well as excessive proportion of lead slimes in the charges. The constitutents of the charges should be intimately mixed. The charges should contain the correct moisture content. The ignition of the charges must be carefully watched. With a concentration of 7-8%, a commercial scheme for the recovery of SO2, either as liquid SO2, sulfuric acid, or sulfur is feasible.

21297 APTIC NO. 40554

Wiedemann, C. R.

A CASE HISTORY OF COLLECTION EQUIPMENT. *Preprint, American Foundrymen s Society, Des Plaines, Ill., 4p., 1970. (Presented at the Total Environmental Control Conference, Ann Arbor, Mich., Nov. 16-19, 1970, Paper IV-2.)*

A case history of dust collection equipment in a Kentucky foundry was presented. All dust collectors are the orifice-type wet scrubbers, with individual sludge ejectors discharging into the respective sluicing systems. The foundry dust collector effluent is mainly silica dust with a percentage of metallics from the cleaning room. Due to the fact that the dust collectors use a separate water system, this effluent is in the nature of a slurry, which contains about 20% water by volume. The sludge then enters a settling tank.

21298 APTIC NO. 40608

Wiedemann, C. R.

A DISCUSSION OF SOME CUPOLA DUST COLLECTION SYSTEMS - PART 3. *Mod. Casting, 57(1):72-74, Jan. 1970.*

Electrostatic precipitators have not yet been successfully applied to gray iron cupolas because, at the elevated temperatures at which the precipitator equipment must be operated, the resistivity of the silica in the cupola effluents increases to the point where the gases must be wetted. In this moist environment, the iron oxides in the effluent gases tend to coagulate on the collector plate and are difficult to remove. In summarizing cupola dust collectors, some specific guidelines are given for applying cloth filters and scrubbers. In general, no one type of collector is applicable to all cupola operations, nor can any of the methods be applied to any one cupola. Rather, economic and engineering considerations must be evaluated for each case.

21299 APTIC NO. 40031

Wippel, Manfred

DIESEL WASTE HEAT REUSED FOR INDUSTRIAL PLANTS. *(Diesel Abwaerme heizt Waermetraeger). Text in German. Energie (Munich), 24(4):18, April 1972.*

Waste gases with high temperature and large heat content are obtained from large stationary and mobile (ship propulsion) plants such as incinerators for refuse, wood refuse, and coffee residues. This heat can be used for heating tanks, presses, driers, and similar facilities. To provide a continuous auxiliary supply of heat an oil-fired boiler is also used. Thus, for waste heat utilization on a ship, an oil-fired boiler and a,waste-heat-fired boiler are connected in parallel for the main operation and successively for the starting and terminating operations. While the ship is anchored in the harbor, no waste heat is available; during this time the oil-fired boiler is in operation. After the ship leaves the harbor the waste-gas-operated boiler becomes the primary supplier while the oil-fired boiler acts as the auxiliary supply.

21300 APTIC NO. 40109

Wolpert, V.

DUST CONTROL AND SMOKE ABATEMENT IN THE RUHR. *Iron Steel, vol. 35:338-339, July 1962.*

The extraordinary quantity of air polluting smoke produced in the Ruhr is principally due to the exceptional concentration of converters serving the basic Bessemer steelmaking process used in Germany. In view of the magnitude of the problem, the Bessemer steel works, grouped together in the Windfrischgemeinschaft or Air Blowing Association, with the support of the European Coal and Steel Community, decided on large scale experiments under working conditions. The result is the giant smoke abatement installation at the Mannesmann steel works at Huckingen. Apart from the field experience gained in this way, remarkable and effective results have been achieved in a number of applications, some of which are listed. Dust control at the sinter installation, blast furnaces, and carbonization plant are noted. A heat reduction chamber and filters are described for smoke abatement.

21301 APTIC NO. 40178

Yokoi, Masao

PROCESS CLEANS SO2 FROM SINTERING WASTE GAS. *(Shoketsu haigasu no datsuryu purosesu). Text in Japanese. Seramikkusu (ceramics), 6(10):120-128, Oct. 1971.*

In the indirect desulfurization of heavy oil, the sulfur content can usually be decreased only to about 1%, with a catalyst life of one year. Further desulfurization would cause a significant decrease of catalyst life, thus increasing the cost of operation. In direct desulfurization, since independent treatment of residue oil of reduced pressure distillation and asphalt has not been established, only 50% of the sulfur contamination in heavy oil can be removed. Various desulfurizing processes developed in Japan and foreign countries were tabulated with respective characteristics. Experimental results from the desulfurization process with 30,000 cu n m/hr capacity for sintering flue gas developed by the Japan Steel Pipe Co. showed that, using an ammonia water of pH higher than 8.0, the sulfur dioxide concentration in flue gas could be decreased from 600 ppm to lower to 1050 ppm to lower than 50 ppm. A new process was developed using concentrated ammonium sulfite to absorb SO2 which resulted in the formation of ammonium bisulfite which then reacted with NH3 gas supplied from a coke furnace to form ammonium sulfite. The product was removed as ammonium sulfate after oxidation. By appropriate adjustment of pH value, more than 90% of the SO2 could be removed.

21302 APTIC NO. 40949

Yorke, A.

AIR-BAG FILTRATION. *Aust. Chem. Eng., 13(1-2):17-23, Jan./Feb. 1972. (Presented at the New South Wales University, Chemical Engineering Graduates Association Graduate Retraining Course, Australia, Oct.-Nov. 1971.)*

A fabric filter is one in which the dust-bearing gas is passed unidirectionally through a fabric in a manner so that the dust particles are retained on the dirty gas side of the fabric, while the cleaned gas passes through the fabric to the clean gas side, whence it is removed by natural and/or mechanical means. The ability of the filter medium to pass clean air is normally stated as permeability and is the volume of clean air that is passed through one sq ft of the filter at a pressure differential of 0.5 inches of water gauge. Surface (sieve) and depth filters are described. Mechanisms of filtration include: flocculation or agglomeration, interception by impaction, diffusion, electrostatic charge, thermal effects, and sieving. Retention, mechanical or chemical filtration, effect of fiber diameter and aerosol diameter, media-cake characteristics, differences between a liquid filter and a gas filter, and filter fabric types and characteristics are discussed. Collection efficiency and causes of fabric failure are mentioned, including factors affecting service life and fibers of the future.

21303 APTIC NO. 40518

Yoshida, Masagi

POLLUTION PREVENTION BY ROTARY SPRAY BURNERS. *(Kaiten muka baana o oyoshita ni san no kogai boshi sochi). Text in Japanese. Nenryo Oyobi Nensho (Fuel and Combustion), 38(8):735-743, Oct. 8, 1971.*

A rotary spray burner can be used as a preventive device for air pollution. The waste sludge containing oil which is generally difficult to incinerate, can be burned to ashes in a short period of time by first mixing it with direct fuel oil into a liquid form and then by applying the rotary spray burner from the upper position of a square incinerator. Because of high intensity heat, it produces no fume or smell after the combustion. The waste oil or fluid, containing unknown chemical compounds, can be burned completely by adding heavy oil (60% in the ratio to the total volume) to it and placing two rotary burners in different positions in the incinerator. With a rotary burner, the combustion of a mixture containing 70% heavy oil and 30% liquefied petroleum gas gives an exhaust gas with 33% less sulfur dioxide than that emitted by burning heavy oil alone. The ratio between heavy oil and LP gas can be changed, depending on the amount of sulfur content in the fuel, and thus its exhaust can meet the sulfur dioxide standard requirement.

21304 APTIC NO. 40489

Zeimert, M. Jacques

RESULTS OF TESTS ON DIESEL ENGINES. *(Resultats d essais sur moteurs Diesel). Text in French. Ings. Automobile (Paris), 44(7):365-371, July 1970.*

Experiments were conducted in co-operation with the firm Soproni concerning electronic injection on engines with controlled ignition. Tests were made for adapting this injection method to Diesel engines. The essential difference between mechanical and electronic injection can be defined as follows: With mechanical injection, the output of the injection pump per pump stroke is constant, irrespective of the engine speed, in the range between half full speed and full speed. Since the movement of the injection pump is mechanically tied in with the rotation of the crankshaft, the duration of injection expressed in angle of rotation is constant, whereas the corresponding time is variable, and consequently the flow speeds and pressures in the fuel lines are also variable. With electronic injection, the duration of injection is kept constant even when the engine speed varies, which means that the angle of crankshaft rotation per injection increases with the speed, and the pressure of the fuel oil remains constant. The test set-up has a four-cylinder engine, which included four injectors, the electronic control unit, a sensor at the engine for transmitting signals to the control unit, a pressure regulator, a hydraulic pump, and an accumulator. The results concerning engine performance are promising.

21305 APTIC NO. 40689

Zykov, S. A., Z. F. Nemtsev, V. S. Branskiy, and A. P. Loskutov

CONTRIBUTION TO THE OPTIMIZATION OF THE BASIC ELECTRIC POWER PLANT STACK CHARACTERISTICS. *(K voprosu optimizatsii osnovnykh kharakteristik dymovykh trub moshchnykh elektrostantsiy). Text in Russian. Teploenergetika, no. 4:50-54, 1972. 8 refs.*

Procedures for the optimization of the basic characteristics of electric power plant stacks are outlined. The necessary investments as a function of stack diameter, height, material, wind, soil conditions, design, and regional factors were assessed by means of multiple correlations and regressions. The error for the above method lay in a range of 10-46%. Formula was developed for the determination of the necessary stack height on the basis of sanitary standards, as well as total and specific emissions as a function of the gas flow rate, temperature stratification, rate of sedimentation, the temperature difference between gas and ambient air, and the number of stacks applied. The gas flow rate at the top of the stack was optimized for minimum expenditures as a function of the fuel sulfur and ash contents, the temperature stratification, diameter, height and number of stacks, and the stack resistance. The optimum velocity ranged from 10 to 26 m/sec. The optimum number of stacks should be determined by means of the above procedure, combined with analyses of expenditure variants. The calculations revealed the advantage involved in the reduction of the number of stacks, and in the use of multiple stacks, in particular.

MEASUREMENT METHODS

21306 APTIC NO. 39909

TRW Systems Group, Redondo Beach, Calif.

AIR QUALITY IMPLEMENTATION PLAN FOR THE STATE OF ALASKA. VOLUME V: SURVEILLANCE SYSTEM. *Office of Air Programs Contract 68-02-0048, Rept. APTD-0975, 69p., Dec. 1971.*

NTIS: PB 208332

Existing air pollution data gathering programs are described separately for the Cook Inlet Air Quality Control Region, Fairbanks North Star Borough, and the remainder of the state. Minimum federal requirements for air quality surveillance in each of these areas is detailed, and a surveillance system to meet them is proposed. Sample collection techniques and methods of data handling and analysis which are to be consistent throughout the state are described. Also detailed are experimental methods for studying effects of automotive traffic on total suspended particles particle size distribution as a function of sampler elevation, and variation in dust fall with sampling elevation.

21307 APTIC NO. 40253

INSTRUMENTS ON THE FIRING LINE AGAINST ENVIRONMENTAL POLLUTION. *Prod. Eng., 43(5):24-30, May 1972.*

Instruments of interest in air pollution monitoring fall into three classes: monitors for ambient quality, for stationary source emissions, and for automobile emissions. At present, instruments for checking ambient air quality are principally automated versions of wet chemical techniques and require considerable attention for good results. Instruments are being developed based on optical methods. A spectroscopic instrument now being evaluated can detect ozone, sulfur dioxide, nitric oxide, and nitrogen dioxide automatically. Manual operation permits detection of ammonia, mercury vapor, and aldehydes. Stationary source emission checking requires instruments for stack plume opacity and for measurements of gases and particulates inside the stack. Laser instruments are available for measuring stack plume opacity. Gaseous emissions are more difficult but development is proceeding. There are at present no instruments available that can stand up to the conditions inside a stack. Automobile emission monitoring requires measurements of hydrocarbons, carbon monoxide, and particulates. A proposed system for use in New Jersey will remove water vapor, filter the particulates, and measure hydrocarbons and carbon monoxide by infrared absorption.

21308 APTIC NO. 40305

Environmental Protection Agency, Research Triangle Park, N. C., Office of Air Programs

USERS MANUAL: SAROAD (STORAGE AND RETRIEVAL OF AEROMETRIC DATA). *OAP Pub-APTD-0663, 65p., July 1971.*

NTIS: PB 201408

The storage and retrieval of Aerometric Data (SAROAD) consists of a set of standard formats for recording validated measurements for different pollutants and associated meteorological observations with various averaging times and a set of standard codes for identifying such items as pollutants, site locations, and methods of sampling and analysis. Improved forms for recording and submitting data are described. Data submission on paper forms, punched cards, and magnetic tape are described individually. Information is also provided concerning the conversion of existing data to the SAROAD format, and the submitting of past data not in the SAROAD format.

21309 APTIC NO. 40328

Tokyo Metropolitan Environmental Protection Research Inst.

DETECTION OF PAN. *Preprint, 10p., 1971 (?). 3 refs*

Peroxyacetyl nitrate (PAN) was synthesized and identified in a study of photochemical smog. Synthesis was accomplished by injecting 500 microliters of ethyl nitite vapor into a Pyrex glass tube containing an equal volume dry oxygen, then irradiating the mixture with luminescent light for 1 hr, followed by the addition of another 500 microliters of ethyl nitrite to the mixture and irradiation for 1 hr. Analyses of the mixture by an infrared spectrophotometer, a gas chromatographic mass spectrometer, and gas chromatography were performed and results reported. Heating of the synthesized mixture produced lower peaks of PAN, which disappearing entirely when the mixture was heated to 95C. Injection of a 5% aqueous sodium hydroxide solution eliminated the peak of PAN.

21310 APTIC NO. 40447

SMALL ON-LINE COMPUTER CONTROLS EMISSION TEST. *Automotive Eng., 80(6):42, June 1972.*

Two minicomputers for vehicle production-line testing are described. Operating on-line and in real time, each computer issues instructions to the driver for mode control, logs data during the run, and calculates gram/mile emission rates for several pollutants. One of the computers has the capacity to monitor up to four test stations, which in turn measure high and low hydrocarbons, carbon monoxide, carbon dioxide, and nitrous oxide. About 36 vehicles can be tested per day with the computers, compared to about 20 using a larger time-shared computer. The lease cost is less than $1000/month.

21311 APTIC NO. 40475

AIR POLLUTION MONITORING AND IMMEDIATE ALARM SYSTEMS. *(Sistemi di rilevamento e di allarme immediato contro l inquinamento atmosferico). Text in Italian. Ingegneria (Italy), 2(123-127, Feb. 1972. 6 refs.*

Air pollution monitoring serves three purposes, that of determining the distribution of atmospheric pollution over large geographic areas, that of determining long-term air pollution movements and trends, and that of short-term determination of pollution levels in circumscribed areas. Measurement results serving the two latter purposes are used in the formulation of an appropriate pollution control policy. The WHO has chosen sulfur dioxide as an indicator pollutant because it is a major pollutant and because it is easily measurable. The median hourly SO2 concentration serves as the indicator. A network of monitoring stations is needed to quickly and directly detect an increase in the total pollution level when a monthly reference level has been established. Hourly SO2 concentrations, even from the same station, are not comparable because of many variables, and they are therefore reduced by the application of appropriate formulas to a single indicative value which indicates the true momentary state of contamination. The alert value depends further on the velocity with which the atmospheric pollution level rises and is different for different industrial areas. Monitoring stations must not be located more than 2-3 km from major sources of pollution. Long-term prediction of pollution requires a computer which can quickly process a wealth of median hourly and daily concentrations. The plotting of the distribution of the frequency of SO2 concentrations on a logarithmic scale has proven very useful in pollution forecasting. The resulting line is characteristic for the frequency distribution for a given geographic location and a certain time period. A change in environmental conditions moves the line (the result of hundreds or thousands of measurements) in parallel up or down which means that all concentration levels are influenced in the same manner. It is preferable to establish such a curve for each monitoring station rather than for a whole system, even though a curve for a whole system can be a sufficient indication of the general pollution level.

21312 APTIC NO. 40624

AUTO ANALYZER FOR ENVIRONMENTAL CONTROL. *(Autoanalyzer fuer Umweltkontrolle). Text in German. Wasser Luft Betrieb, 16(5):165, May 1972.*

The Technicon automatic analyzer is suitable both for determination of several or individual parameters of continuously taken or individual samples of water, air, and solid matter. Samples and reagents are united under exactly defined conditions and passed to the measuring point via various analyzing stations operating under standardized conditions. The data are printed out by a recorder.

21313 APTIC NO. 40674

Asbestosis Research Council, Lancashire (England)

DUST SAMPLING FOR USE WITH THE ASBESTOS REGULATIONS 1969. *TN-2, Jan. 1971, 7p.*

Guidance is given on the practical aspects of sampling airborne asbestos dust. Both 10-minute and 4-hour sampling are explaine5d and described, and details on apparatus and procedure are given. The 10-minute sampling period is to provide an initial assessment of the atmosphere in working environments. An acceptable assessment of dust concentration can be obtained by taking a series of snap samples, using a membrane filter. Static of mobile samplers are recommended. Samples of airborne asbestos collected will normally be assessed by microscopic counting methods. The 4-hour sampling period is intended to provide an indication of the level of airborne asbestos dust to which an employee has been exposed during his working day. For continuous sampling, static samplers with high or low flow rates can be used. Samples collected by a sampler with a high flow rate will be assessed by a direct gravimetric method, such as X-ray diffraction, atomic absorption, or chemical analysis. Discontinuous sampling, with stationary or mobile equipment, can also be used.

21314 APTIC NO. 40246

Aitken, Allan

FORD OF BRITAIN: THE BATTLE AGAINST EMISSIONS. *Automotive Ind., 146(9):27-30, May 1, 1972.*

The company is currently spending over $6.5 million annually on engine research and test operations to reduce emissions. At the Dunton emission laboratory, four types of gas analysis are in use. Non-dispersive infrared analyzers monitor hydrocarbons in concentrations ranging from 0-1000 ppm to 0-10,000 ppm, carbon monoxide in the ranges 0-3% to 0-10%; carbon dioxide in the ranges of 0-4.5% to 0-15%; and nitrogen oxides in the ranges 0-1000 ppm to 0-5000 ppm. Non-dispersive ultraviolet analyzers are used to monitor nitrogen dioxide in the range 0-300 ppm. The total hydrocarbon analyzer uses the flame ionization detection method to determine the hydrocarbon concentration in a gas mixture. A hydrogen flame is burned in a mixture of air and the sample gas, and the ionization produced when traces of hydrocarbons are introduced with the sample gas causes current flow in the detection circuit. The range of concentration that can be measured are from 0-1 ppm to 0-10,000 ppm. Oxides of nitrogen are measured by chemiluminescence, a process in which the total nitric oxide and nitrogen dioxide contents of exhaust gas is converted to nitric oxide by heating to 600 C, and then measuring the intensity of light emitted when the nitric oxide is converted to nitrogen dioxide by the addition of ozone. A Kent computer is also used to determine the exact moment in a test exhaust cycle when emissions are at their maximum.

21315 APTIC NO. 40710

Aleksandrov, E. L.

MEASUREMENT OF CONDENSATION AND CLOUD NUCLEI CONCENTRACTIONS (SURVEY). *(Izmereniye kontsentratsiy yader kondensatsii i oblachnykh yader (obzor)). Text in Russian. Tr. Inst. Eksp. Meteorol., no. 19:50-80, 1970. 115 refs.*

Various instruments for condensation and cloud nuclei measurements, operating under supersaturation conditions, are reviewed. Though many instruments have been developed, none of them is capable of satisfying all the needs of modern atmospheric physics. Nolan-Pollak type counters are most suitable for condensation nuclei condensation measurements. Here, the concentration is determined indirectly from the light attenuation in the aerosol chamber, and internal calibration is applied. The problem of the actual supersaturation in adiabatic expansion type counters requires further study. Instruments based on the principle of thermal diffusion are best for measurements of cloud nuclei concentrations, though major improvements are necessary. Measuring the concentration of the formed particles in instruments of intermittent action is problematic. Photoelectric droplet counters, combined with flow type counters using the thermodiffusion effect are not able to guarantee stationary supersaturation distribution profile in the chamber. The actual supersaturation profile in non-isothermal chambers, particularly at high droplet concentrations, requires comprehensive theoretical and experimental investigations. The method of the chemical diffusion has been replaced by the above thermodiffusion method in cloud nuclei concentration measurements.

21316 APTIC NO. 40594

Arbogast, A. H.

THE QUANTITATIVE DETERMINATION OF DUST IN GAS. *Iron Steel Engr., 25(10):82-89, Oct. 1948.*

In the gravimetric determination of dust in furnace gases, the size of the sample nozzle depends on the size of the gas main being sampled, the rate of flow in the gas main, and the assumed rate of flow in the sampling tube nozzle. Dust can be separated and collected by several different methods; the most practical for routine test purposes are scrubbing with water or dry filtration. The scrubbing method is of particular value where a physical and chemical evaluation of the dust is involved. The sugar-filtration method, where sugar is utilized as the filtering medium, should be applieed only where indicated by excessive entrained scrubber water with a high content of dissolved solids. The cotton bag filtration method can be used with gases below 220 F where high dust concentrations or a large quantity of entrained water foul other types of dry filters. For temperatures greater than 220 F, woven glass-wool fabrics will give satisfactory results. The paper thimble method for blast furnace gas is described. Gases can be measured with orifice test meters, laboratory wet test meters, or dry or diaphragm test meters. The simplest method of determining moisture in air involves the use of a sling psychrometer equipped with wet and dry bulb thermometers. A psychrometric table is used for conversion of the temperature observed to relative humidity, or percent saturation. Entrained moisture in low temperature gases is best determined by passing the gas through an efficient dessicant.

21317 APTIC NO. 40275

Arceivala, S. J., C. V. Sabnis, and P. K. Yennawar

HOW TO CONDUCT AIR POLLUTION SURVEYS. *Central Public Health Engineering Research Inst., Nagpur (India), 33p., 1969 (?) 5 refs.*

The guide introduces many aspects of air pollution study to encourage and direct the establishment of air quality monitoring programs in India's large cities. Tables show a comparison among several cities of the world with regard to typical air quality (dust fall, suspended particulates, and gases) and ambient air quality standards and workroom air threshold limit values for several gases (carbon monoxide, chlorine, hydrogen chloride, hydrogen sulfide, ethylene ozone or oxidants, nitrogen oxides, and sulfur dioxide). Areas of suggestions for air survey programs include duration of programs, selection of air sampling stations, selection of air pollution parameters, plan of work, frequency and mode of sampling, and staff and budget requirements. Also included are descriptions and photographs of several common instruments used in air pollution studies. Meterological factors such as wind, inversions, and plume behavior are discussed, as well as the effect of stack height on diffusion.

21318 APTIC NO. 39984

Askew, William C.

HYDROGEN FLAME IONIZATION DETECTION OF INERTS USING AN IONIZING CARRIER GAS. *Anal. Chem., 44(3):633-634, March 1972. 6 refs.*

A technique that permits detection of inerts by a hydrogen flame ionization detector is examined. A dual column, dual hydrogen flame ionization detector gas chromatograph with a strip chart recorder was used. Various amounts of gaseous samples were injected; the responses were negative peaks for nitrogen, helium, carbon dioxide, and sulfur dioxide. A sample of natural gas was injected and typical hydrocarbon responses (positive peaks) were determined. The response values were not linear for the sample sizes injected. Separating ability for mixtures and peak shape depend on the chromatographic column and analytical operating conditions used. 0

21319 APTIC NO. 39916

Aue, Walter A., Corazon R. Hastings, Shif-Fu Tsai, and Pankaj M. Teli

TRACE ANALYSIS WITH SUPPORT-BONDED GLC PHASES. *Missouri Univ., Columbia, Proc. Missouri Univ Fourth Annu. Conf. Trace Substances Environ. Health., Columbia, Mo., 1970, p. 386-395. 8 refs. (June 23-25.)*

Research on support-bonded silicone phases, a new tool of great potential in chromatography, is described. These silicones are chemically bonded to typical chromatographic supports and can be used for several types of partition chromatography. They are neither extracted nor hydrolyzed by common solvents and have been used in exploratory liquid-liquid chromatography. Most have excellent temperature stability and can be advantageously employed in gas-liquid chromatography/mass spectrometry or by certain selective detectors. A third area of application is the collection of organic compounds from polluted air flowing through a column of supported-bond phase, which is subsequently extracted and the concentrated extract analyzed. (Author abstract modified)

21320 APTIC NO. 39837

Barnes, E. C.

ATMOSPHERIC SAMPLING BY ELECTROSTATIC PRECIPITATION. *Interdepartmental Committee on Air Pollution, Washington, D. C., Air Pollut., Proc. U. S. Tech. Conf., Washington, D. C., 1950, p. 547-555. 11 refs. (May 3-5, Louis C. McCabe, ed.)*

Both alternating and direct current precipitators are used as air sampling devices. An AC precipitator generates a large amount of ozone which rapidly deteriorates rubber stoppers in the effluent air stream and is toxic if breathed. For this reason it is customary to pass the effluent air through a bed of activated charcoal to remove the ozone. The DC precipitator uses pre-ionization with subsequent precipitation between concentric cylindrical plates. For either type, the total amount of dust collected in the tube must be kept small enough so that a thick layer with poor adhesive characteristics will not result and the dust be blown off the tube. The proper operating voltage must be maintained on the ionizing wire throughout the entire sampling period. If weight determinations are to be made, the tubes must be properly cleaned, dried, and weighed prior to sampling. After the first sample at a given sampling location is taken, the inside of the collecting tube should be inspected for the character of the dust deposit. In the DC sampler, the central electrode should be inspected after each sample to determine whether any of the dust was deposited on it. In the AC precipitator, small amounts of acid are formed due to the corona discharge, and these are deposited on the sample tube. Special applications of the electrostatic precipitator include the dust count sampler and the gross sampler.

21321 APTIC NO. 40711

Belyayev, S. P. and L. M. Levin

EXPERIMENTAL STUDY OF THE AEROSOL ASPIRATION PROCESS. *(Eksperimental noye issledovaniye aspiratsii aerozoley). Text in Russian. Tr. Inst. Eksp. Meteorol., no. 20:3-33, 1971. 28 refs.*

Different factors influencing the aerosol aspiration process were experimentally investigated, and related studies were analyzed. The disagreement in the results of different studies may be due to factors such as deposition and recoil of particles as well as shape and wall thickness of the tube being ignored. Aspiration coefficients for the maximum diameter of the particle flow tubes were determined by means of a test equipment permitting particle trajectory photography. Possible sources of error, involved in the above method, were analyzed. The aspiration coefficients were studied as a function of the Stokes number, the nature of the flow entering the tube, and of the wall thickness of the aspiration tube. The aspiration coefficient was strongly dependent on the Stokes number and the wall thickness. Absence of concentration distortion and of the deformation of the size distribution spectra in isokinetic flow was observed for very small wall thicknesses only. The deposition of aerosol particles at the inlet was much more intense than that due to Brownian and turbulent diffusion. Intense recoil of aerosol particles with secondary aspiration was observed, while the intensity of the secondary aspiration was dependent on such factors as the flow pattern, tube shape, and recoil height.

21322 APTIC NO. 40758

Berner, Axel and Hemma Reichelt

ON INLET SLIT SYSTEMS IN CONIFUGES. PART I: THE ROSL SYSTEM. *Staub (English translation from German of: Staub, Reinhaltung Luft), 29(3):5-8, March 1969. 5 refs.*

In an effort to avoid disturbances and overcome unavoidable disturbances (e.g., the inlet disturbances of aerosol and clean gas flow) in inlet slit systems of configues, the Rotating Slit Aerosol Spectrometer (ROSL) was developed. Two metallic cylinders form the slit of the measuring chamber which is completed by an outer housing and injection needle. Details on dimensions and construction are given along with their design significance. In particular the height of the top cylinder was chosen so that the inlet disturbances have time to subside before the flow reaches the superposition zone. Furthermore, in this zone all slit elements participating in the superposition process rotate. Data on test results from DOW latex aerosol and BASF latex test aerosol are supplied in graphical representations. The precipitations from the DOW test aerosol displayed 11 separate lines that of BASF test aerosol 9 lines. This result is understandable, since BASF latex has a higher standard deviation than DOW latex; consequently, the individual lines are broader and hence overlap to a greater degree. Measured density distributions were compared with the manufacturer's normal distributions and distinct deviations were noted. The manufacturer's sample did not include the relatively wide base of the density distribution, and the extended wings of distribution were thus not included in the calculation. Hence the standard deviation is lower than that measured during the tests. As the manufacturer's computed the mean value and standard deviation from electron microscopic measurements of 83 latex particles, it seems advisable to measure larger samples with the electron microscope.

21323 APTIC NO. 39898

Bloor, W. A.

REDUCTION OF DUST IN STEELFOUNDRY OPERATIONS. *Foundry Trade J. (London), 91(1819):31-40, 46, July 12, 1951. 22 refs. (Presented at the Institute of British Foundrymen, Newcastle-upon-Tyne, England.)*

Recent methods for measuring and continuously recording dust concentrations in steel foundries are described. The most widely used control methods are those of local exhaust ventilation at the dust sources and the complete enclosure of dust producing processes with provision of exhaust ventilation. To minimize metal dust produced by the stripping and fettling of castings by pneumatic tools, it appears desirable to employ molding materials of as fine a grain size as possible consistent with the maintenance of adequate resistance to general sintering. Animals experiments on the effects of dust inhalation on respiratory diseases are discussed. Concentration estimations, photographic scales, print comparison, screen image comparison, and free silica determinations are described. Using Owens jet apparatus and a salicylic acid filter with the methods of estimation described, existing conditions in steel foundries were surveyed and a wide variety of conditions. Dust concentrations vary from under 200 particles per cu cm to over 6400/cu cm. The free silica content of airborne dusts vary from 11 to 73%. The results were partly dependent on the amount of general atmospheric pollution associated with the area in which the foundry was situated. Many processes showed high concentrations due to contamination of the atmosphere by adjacent dusty processes.

21324 APTIC NO. 40010

Bockian, A. H. and M. A. Hostak

A COMPARISON OF FILTERABLE MASS AND LIGHT SCATTERING OF PHOTOCHEMICALLY PRODUCED AEROSOLS. *J. Colloid Interface Sci., 39(1):90-93, April 1972. 9 refs.*

Particulate concentrations and nephelometric visibilities of 10 miles and less, measured in the Los Angeles atmosphere, correlated reasonably well as V times M to the a equals K, where M is particulate mass per unit volume, V is visibility, measured either visually or derived from light-scattering measurements with an integrating nephelometer, K is a proportionality constant, and a equals 1.67. This value is significantly greater than the 1.0 value found in other cities. Studies conducted in an environmental chamber demonstrated that aerosols produced in an olefin-nitric oxide system produce an unusually small filterable mass compared to that predicted from the amount of light scattering. This observation may partially explain the unusual mass-visibility equations derived from the atmospheric studies, and shows that atmospheric particulate concentrations determined by the glass-fiber filter method may be an inadequate indicator of visibility in locations where photochemical smog exists. The results indicate further that visibility improvement in an area plagued by photochemical smog may be much less than predicted from reductions in concentrations of total particulates.

21325 APTIC NO. 40724

Bowman, Harry R., John G. Conway, and Frank Asaro

ATMOSPHERIC LEAD AND BROMINE CONCENTRATION IN BERKELEY, CALIF. (1963-70). *Environ. Sci. Technol., 6(6):558-560, June 1972. 8 refs.*

Lead and bromine aerosols collected in downtown Berkeley, California, for 1-week periods over the past 8 years, were analyzed using nondispersive x-ray fluorescence analysis. Typical analyses times were 2 min. The technique is nondestructive so that the filter papers can be reanaalyzed if needed or saved for future reference. With an increase of less than an order of magnitude in the airflow and the excitation source and no folding of the filter paper, results comparable to those reported here would be obtained with 2-hour collections and 24-hour counts. A system of continuous air monitoring could be installed in which data from many remote locations could be fed to a single central computer. As the equipment is easily made portable, temporary stations could also be established. Seasonal lead variations similar to those found in the San Diego area were observed and appear to be correlated to data for wind and wind direction. The ratio of bromine-to-lead collected on filters appears to be higher in Berkeley than in six other cities previously reported. (Author abstract modified)

21326 APTIC NO. 40752

Brooks, S. H., R. A. Kipling, and I. C. Ross

SAMPLING SYSTEMS FOR WASTE GAS ANALYSIS FROM OPEN-HEARTH AND AJAX FURNACES. *J. Iron Steel Inst. (London), vol. 201:202-207, March 1963.*

The basic design and application of continuous high-speed sampling systems for the analysis of waste gases in open-hearth and Ajax furnaces are examined. The sampling systems consist of sampling probes, steam ejectors, a venturi scrubber condenser, a cyclone separator, and sample delivery lines; they were designed to sample gases at a high temperature which have a heavy dust concentration. The reliability of each apparatus is such that the sampling system could form part of an automatic control loop for trimming the combustion air to maintain a fixed percentage concentration of oxygen in the waste gases. Where it is necessary to control a process in which changes in gas composition occur rapidly a system with a faster speed of response would be desirable, particularly if the amount of combustion air fed to the furnace is to be controlled directly from the output signal of the analyzer. Both sampling systems can be used in conjunction with other types of analyzer, e.g., the infrared carbon monoxide analyzer. Although the apparatus is basically used to measure the percentage oxygen in the waste gases as they leave the furnace to control or trim the combustion air, it can also be used for other gases and is not restricted to the Ajax or OH furnace. (Author conclusions modified)

21327 APTIC NO. 40211

Brown, Harry

A NEW INSTRUMENT TO READ GASEOUS FLUORIDE IN AMBIENT AIR DOWN TO FRACTIONS OF A MICROGRAM/CU M. *Instr. Metals Ind., vol. 21, 4p., 1971.*

A new instrument designed to measure the amount of gaseous fluoride which may escape into the atmosphere from phosphate fertilizer plants, aluminum smelters, and certain incineration, brick, chemical, and glass works, is described. The absorber assembly or carousel consists of three glass tubes in a rotating assembly; these align to steer the airflow or solutions through the correct tube. One tube is in the air stream, and collects the fluoride gas from the air drawn through it by a vacuum pump from the atmosphere. The intake tube feeding into this samping tube is heated to prevent condensation, which would result in dust buildup causing erratic fluoride readings. Once a sample has been collected, the three-tube assembly rotates, bringing the next tube to the air sampling position and placing the tube with the current sample in a position to be washed by a measured amount of colorimetric solution, supplied by bellows pump. This solution, containing the sample, is mixed and passed to a photometer for measurement. The MK II design allows unattended operation for long periods (over 1 wk) and produces a faithful record of the ambient air level measurements of this pollutant down to .02 microgram/cu m. A new monitoring approach is suggested using the MK II Satellite Sensing Unit, where fluoride levels about the perimeter of an industrial site can be measured, to construct Isofluons on an area map.

21328 APTIC NO. 40162

Carlsson, Sten

NUCLEAR METHODS FOR MEASUKEMENT AND CONTROL OF ENVIRONMENTAL POLLUTION. *(Nukleara metoder vid matning och kontroll av omgivningsfoeroreningar). Text in Swedish. Lakartidningen, 68(28):3229-3231, 1971.*

Nuclear methods in measurement and control of environmental pollution are discussed. In isotope techniques, stabile or radioactive trace elements are used to study processes in and properties of compounds. This method is applied in air and water protection to study the spreading and dilution processes of pollutants. For the detection of biocides, radioactive elements are used. In nuclear activation analysis, one or more substances present in a sample are activated by bombardment with adequate particles, which allows these substances to be quantitatively determined from the induced radioactivity. This method is widely used in the study of the spreading and dilution processes of particular pollutants from point sources, and in the measurement of pollutant concentrations. The disadvantages involved in this method are impossibility of chemical analysis and of activating certain materials. X-ray fluorescence analysis has been applied in environmental protection as a supplement to activation analysis onl but has a promising outlook. This method is based on the effect of the formation of an unstable vacancy when an electron jumps from one of the outer shells towards one of the inner shells and releases energy that produces X-rays characteristic of the given atom.

21329 APTIC NO. 39872

Cassel, Hans M. and Harold Schultz

A SONIC METHOD OF DETERMINING PARTICLE SIZE IN AEROSOLS. *Interdepartmental Committee on Air Pollution, Washington, D. C., Air Pollut., Proc. U. S. Tech. Conf., Washington, D. C., 1950, p. 634-642. 15 refs. (May 3-5, Louis C. McCabe, ed.)*

Suspended particles were subjected to sonic vibrations and the particle dimensions were determined from measurement of the resultant amplitudes. The theoretical basis for the method is presented. A slowly rising dust stream, exposed to a horizontal sound wave of known frequency, was dark-field illuminated and observed or photographed through a low-power microscope. The tracks of the particles showed on the micrographs as sinusoidal curves whose amplitudes depended on particle size and frequency. An abbreviated procedure for particle size distribution analysis is given. A quantitative distinction can be made by setting the dividing line at half the air amplitude, the fine particles swinging with greater, the coarse with smaller, than the 1/2 air amplitude. On this basis, particle size distribution can be estimated by scanning the dust cloud with sound waves of increasing frequencies, the scale of frequencies corresponding to the mesh scale in screen analysis. A count of the number of sound tracks whose amplitudes are smaller or greater than the 1/2 air amplitude given the number of particles whose diameter is greater or smaller than the critical diameter. Sources of error include limitation of illumination, the shape factor, particle collisions, and effect of overtones. The sonic method of particle-size determination has the advantage of eliminating changes in the state of dispersion of the suspended matter and of permitting direct evaluation of Stokes diameters, or of sedimentation velocities, when particle densities are not known.

21330 APTIC NO. 39840

Chaney, A. L.

A RECORDING VISIBILITY METER. *Interdepartmental Committee on Air Pollution, Washington, D. C., Air Pollut., Proc. U. S. Tech. Conf., Washington, D. C., 1950, p. 679-682. 2 refs. (May 3-5, Louis C. McCabe, ed.)*

A recording visibility meter is described in which the light received from the target is focused by a long lens onto a small aperture in front of a photocell, the output of which is amplified and measured by a strip chart recorder. By means of a slow speed motor-driven diaphragm or similar device, two or more similar targets at different distances may be viewed in turn through different apertures, together with an interval for recording the zero position of the amplifier and photocell. The resulting record is a series of steps, the length of each being proportional to the light intensity from each target in turn. The formulas used for calculating the visibility from these data are given. Advantages of this system are cited.

21331 APTIC NO. 39868

Chaney, Albert L.

DIRECT PHOTOGRAPHY OF AEROSOL SUSPENSIONS. *Interdepartmental Committee on Air Pollution, Washington, D. C., Air Pollut., Proc. U. S. Tech. Conf., Washington, D. C., 1950, p. 603-606. 2 refs. (May 3-5, Louis C. McCabe, ed.)*

Principal improvements in the direct photography of dust particles are due to the developments in high intensity flash sources of illumination and to the substitution of small angle scattering for right angle scattering to improve optical efficiency. The principal features of the camera are a 25 mm lens, an aperature of 1/4 in., a dark field condenser which uses internal reflection for focusing the light ray, and a FT-230 tube for the light source. When the type of records obtained from known aerosol is determined, it is possible to obtain information about particle size and particle size distribution from the photograph. This may be done in different ways. In the size range in which sedimentation is reasonably rapid, a series of shots on the same sample at various intervals will enable counts to be made on those particles remaining in suspension, which can then be related to particle size, provided the densities of the particles are known. A second procedure is to use a series of decreasing light intensities, and note the number of particles in the field with each successive change of illumination. This is a classification of particles on the basis of their light scattering power. Another procedure based on scattering power is to consider the range of size of circular images which are produced.

21332 APTIC NO. 40466

Charlson, R. J.

MULTIWAVELENGTH NEPHELOMETER MEASUREMENTS IN LOS ANGELES SMOG AEROSOL. PREFACE. *J. Colloid Interface Sci., 39(1):240-241, April 1972. 3 refs.*

In a smog aerosol study conducted at the California Institute of Technology in August and September of 1969, light scattering was measured with two broad-band and one multiwavelength integrating nephelometers. The broad wavelength band light scattering correlated very highly (correlation coefficient greater than 0.9) with monochromatic light scattering. The four narrow band coefficients correlated even better (correlation coefficient greater than 0.95). Mie scattering theory was applied to measured size distributions and the calculated light scattering was compared to that measured by the nephelometer. A high correlation (between 0.8 and 0.9) for the calculated versus measured quantity was found. Measured scattering was systematically higher than calculated by a factor of about two. A least-squares fit to a power-law size distribution was made, and the exponent (v) correlated with the exponent (alpha) of a power-law approximation of the wavelength dependence of scattering. The various regression equations compared well with the theoretical relationship, alpha is equal to v-3, and the correlation coefficient between alpha and v ranged between 0.83 and 0.93. This result supports the use of this technique for rapidly obtaining an index of size distribution in the 0.1 to 1.0 micron size range. Calculated volume concentration and measured light-scattering coefficients had correlation coefficients around 0.8. The calculated volume concentration/light scattering ratio is about one third of that determined empirically in other experiments. A comparison of the magnitude of extinction due to scattering by aerosols and absorption due to nitrogen dioxide (NO2) showed that NO2 could contribute significantly to extinction at 550 nm about 20-30% at the time.

21333 APTIC NO. 40230

Charmbury, H. B.

THE USE AND LIMITATIONS OF THE MIDGET IMPINGER FOR DUST EVALUTION. *Interdepartmental Committee on air Pollution, Washington, D. C., Air Pollut., Proc. U. S. Tech. Conf., Washington, D. C., 1950, p. 184-192. 21 refs. (May 3-5, Louis C. McCabe, ed.)*

The midget impinger, which provides information only on the amount of solids suspended in air expressed in millions of particles per cubic foot, is at present the standard means of evaluating solid dispersions which constitute a physiological hazard, but may also be used to evaluate industrial waste or public nuisance. Its operation is briefly described. The method is purely empirical and gives only relative results which are subject to errors in interpretation unless limitations influencing its use and application are considered. These limitations concern the ability of the apparatus to draw dust into the nozzle tube, loss of the collecting liquid by evaporation, retention of the dust by the liquid, dust shattering, dust stability in the liquid, size range of the dust, and settling time in the cell prior to counting. Experiments were conducted using the midget impinger and two other methods to evaluate the effectiveness of employing water to prevent dust dispersions. All three methods showed good agreement, indicating that, when the necessary corrections are applied, the midget impinger yields results comparable with other methods of evaluating dusts. (Author conclusions modified)

21334 APTIC NO. 40806

Chuan, Raymond L.

MEASUREMENT OF PARTICULATE POLLUTANTS IN THE ATMOSPHERE. *Preprint, American Chemical Society, Washington, D. C.; American Inst. of Aeronautics and Astronautics, New York; Environmental Protection Agency, Washington, D. C.; Inst. of Electrical and Electronics Engineers, New York; Instrument Society of America, New York; National Oceanic and Atmospheric Administration, Washington, D. C., 6p., 1971. (Presented at the Joint Conference on Sensing of Environmental Pollutants, Palo Alto, Calif., Nov. 8-10, 1971, Paper AIAA 71-1099.)*

Representative measurements of the mass concentration of particulate matter in the atmosphere are presented to demonstrate the applicability of a new type of instrument evolved from aerospace research to various types of particulate pollution and their dynamics. The instrument employs aerodynamic impaction of particles onto an adhesive-coated piezo-electric crystal whose resonant frequency decreases with mass accretion on its surface, with a resulting particulate mass resolution of 10 to the minus 11th gram. Applications include air basin wide aerial measurement of particulate mass concentration, jet aircraft wake, stationary industrial sources, direct on-line measurement of automobile exhaust, and techniques for source detection. (Author abstract modified)

21335 APTIC NO. 40323

Chuiton, Genevieve

METHOD FOR THE RAPID DETECTION OF BERYLLIUM. *(Methode de detection rapide du beryllium). Text in French. Centre d Etudes Nucleaires Fontenay-aux-Roses (France), Groupe Pollution Atmospherique et Protection dans les Mines, Note CEA-N-1446, 20p., June 1971. 8 refs.*

A rapid method for the detection of atmospheric beryllium, based on the coloration of eriochrome-cyanine R (sodium salt of sulfo- dihydroxy-dimethyl-fuchsone dicarboxylic acid) in the presence of beryllium ions, is described. The chelation is made possible by the carboxyl groups, and the change in the color of the complex formed is caused by the changes in the electron distribution and the state of resonance. The absorption spectra for different pH values revealed a shift of the acid-base equilibrium towards base formation with increasing pH values. The absorption maximum of the colorant (about 440 milli micron) gradually decrease with increased beryllium content, and the peak characteristic of the complex appeared at 525 milli micron. The absorption maximum was obtained for a beryllium concentration of 2-10 micrograms/cu cm. The disturbing effect of metal ions other than beryllium (iron, aluminum) can be eliminated by means of ethylenediaminetetraacetic acid (EDTA). The dissolution of the atmospheric dust sample was made over 30 min, and the extraction factor was above 60%. The eriochrome-cyanine-beryllium complex was formed at about pH 8.5. The pH adjustment was made by means of ammonium acetate or sodium acetate. The coloration obtained was compared to a standard series containing 0, 0.5, 1, 5, 10, and 50 micrograms of beryllium. The accuracy of the visual comparison was + or 20%, the limit of sensitivity was 0.5 micrograms, provided no disturbing ions were present. The method is suitable for the rapid, relatively inexpensive, and simple detection of beryllium, but it cannot replace other classic determination methods.

21336 APTIC NO. 40330

Clayton, P.

BRICKWORKS ODOURS - A SUBJECTIVE EVALUATION OF A REMOVAL PROCESS. *Warren Spring Lab., Stevenage (England), Dept. of Trade and Industry, Rept. LR 131(AP), 9p., Sept. 1970. 7 refs.*

A process for the removal of brickworks odors by incineration to reduce the threshold values was examined on the basis of subjective evaluation. The brickworks odor was simulated by heating clay in a furnace at 475 C; the odors were passed into a test room for assessment by a panel of observers. The odor threshold was attained by diluting the kiln gas 2,700,000 times with air. Passing the gases through the hot zone of the furnace was ineffective at 600 C, 95% effective at 650 C, and 99% effective after treatment at 700 C and above. A flame ionization detector was used to monitor changes in the removal of hydrocarbons and other organic matter from the gases. (Author summary modified)

21337 APTIC NO. 40944

Comeford, J. J. and M. Birky

A METHOD FOR THE MEASUREMENT OF SMOKE AND HCL EVOLUTION FROM POLY(VINYL CHLORIDE). *Fire Technol., 8(2):85-90, May 1972. 5 refs.*

A method was developed to measure, simultaneously, the evolution of hydrogen chloride and smoke from polyvinyl chloride. As polyvinyl chloride becomes more popular as a building material and electrical insulation, it becomes more important to determine its smoke and HCl evolution characteristics during pyrolysis. A special cell was constructed to allow simultaneous direct measurement of HCl concentration, light attenuation due to the formation of smoke, and temperature of the sample. A double beam prism-grating infrared spectrophotometer was used to monitor the evolution of HCl. The rate of smoke production was monitored by passing the radiation from one end of a helium-neon laser through the cell and measuring the attenuation of this radiation with a photomultiplier. A thermocouple was inserted into the sample compartment. The applicability of this system was demonstrated by measuring the relative rates of evolution of HCl and smoke for a variety of formulations of polyvinyl chloride. The rates were dependent on the composition, pure polymer as compared with commercial formulations, and on the rate of heating. For this system, only in the case of rapid electrical overload of the insulated wire did the evolution of HCl precede the detection of visible smoke. (Author conclusions modified)

21338 APTIC NO. 40708

Cox, F. W., F. W. Penn, and J. O. Chase

A FIELD SURVEY OF EMISSIONS FROM AIRCRAFT TURBINE ENGINES. *Bureau of Mines, Bartlesville, Okla., Bartlesville Energy Research Center, Rept. Investigations 7634, 32p., 1972. 4 refs.*

GPO: 707-699:320

Exhaust emissions were measured from 25 aircraft turbine engines using Jet A fuel. Analytical apparatus, procedures, and results are described. Carbon monoxide, carbon dioxide, nitric oxide, nitrogen dioxide, and aldehydes were measured at engine operating modes representing power levels used in airline operation. Carbon monoxide, hydrocarbon, and aldehyde emissions were highest at idle and lowest at takeoff; oxides of nitrogen were lowest at idle and highest at takeoff. Of the total oxides of nitrogen emitted, nitrogen dioxide constituted from 10-100%, depending on the exhaust gas temperature. Engines retrofitted with smoke-reducing burner cans produced less carbon monoxide, hydrocarbon, and aldehyde emissions, and slightly more oxides of nitrogen than engines with standard burner cans. (Author abstract)

21339 APTIC NO. 40117

Dams, R., R. Heindryckx and K. van Cauwenberghe

CHEMISTRY AND ANALYSIS OF AIR POLLUTION. PART II. *(Scheikunde en analyse van luchtpollutie). Text in Dutch. Ind. Chim. Belge, 37(2):101-124, 1972. 165 refs. PART I. Ibid, 36(7-8):589-626, July-Aug. 1971.*

Physical and chemical properties of and various analytical methods for particulate pollution aerosols are reviewed. Particle size, shape, and weight of pollution aerosols are described with special regard to air constituent ions, Aitken particles, and the fraction above 0.1 micron radius. Particle size determination can be made by measuring the electric mobility in ionized air. Decrease in the conductivity in polluted air due to the increased number of large ions was determined. Aitken particles can be partially analyzed by neutron activation analysis. The human effect on the Aitken particles concentration is shown. While Aitken particles account for about 10-20% of the total mass of natural and anthropogenic aerosols, the largest fraction lies in a range of 0.01-0.1 micron. The particle size of aerosols formed by dispersion from liquids and solids is larger than a 1 micron radius. Some 70-80% of such samples from Central Europe consisted of insoluble substance. Aerosols can be formed from industrial and combustion gases by condensation as well. Aerosols can be removed from the atmosphere by sedimentation, coagulation, cloud formation, and washout. A relationship between precipitation, sunshine, and industrial activity was established. Chemical properties of pollution aerosols and possible reactions are described. Halogenous aerosols can be formed from seawater, fly ash, fuel oil, and exhaust gas. Various sampling methods such as impaction, sedimentation, electrostatic and thermal precipitation, centrifugation, and filtration are described. Analytical methods such as smoke and dust measurements, gravimetry, titrimetry, colorimetry, spectrophotometry, emission spectrometry, flame photometry, atomic absorption, polarography, ring oven technique, and neutron activation analysis are reviewed. The organic composition of aerosols is detailed (neutral fraction, benzenes, naphthalenes, polyaromatic, acid and basic hydrocarbons).

21340 APTIC NO. 40422

DeMaio, Larry

CALIBRATING TRACE GAS ANALYZERS WITH PERMEATION TUBES. *Instrum. Technol., 19(5):37-41, May 1972. 8 refs.*

The permeation tube method for preparation of reliable, known, low concentration gas mixes has advantages over dynamic and static gas blenders. No expensive or complicated equipment is needed and accuracy is equal to or exceeds other methods. It can be considered a primary standard since it is based on weight loss per unit time. Fluorinated ethylene propylene copolymer teflon tubing was filled with n-butane and sealed with steel balls. Assuming a pickup air-flow rate of 1 to 2 cfm and room temperature, typical values of tubing length are 25 cm for 3 ppm and 225 cm for 27 ppm, permeation rates are invariable for a particular lot of tubing. Such tubes have been used successfully for anhydrous ammonia, nitrogen dioxide, anhydrous hydrogen fluoride, phosgene, hydrogen sulfide, and sulfur dioxide. Calibration takes only 4 hours. Tube life is approximately 6 mos.

21341 APTIC NO. 40705

Desbaumes, Paul, Eric Desbaumes, and Claude Imhoff

USE OF A FLUIDIZED SILICAGEL POWDER BED ABSORBER FOR THE MEASUREMENT OF FLUORINE EMISSIONS AND IMMISSIONS. *(Emploi d un absorbeur a lit fluidise de poudre de gel de silice pour la mesure des emissions et immissions de fluor). Text in French. Pollut. Atmos. (Paris), 14(53):56-61, Jan.-March 1972. 6 refs.*

A portable fluidized silicagel powder bed absorber, developed for the sampling of fluorine emissions, was tested in an artificial atmosphere and in an aluminum plant area, and compared to conventional alkaline absorbers. The silicagel powder was impregnated with 3% alcoholic solution of triethanolamine, and then dried at 100 C. The sampling rate applied was 2 l/min. A comparative test of three different techniques for the extraction of the fluoride from the silicagel (maceration, maceration with simultaneous agitation, and elution) revealed the superiority of the latter method which had a maximum efficiency of 99%, depending on the amount of hot water used. Tests with different hydrofluoric acid concentrations revealed a slight decrease (below 99%) in the absorbing capacity of the fluidized silicagel bed absorber for concentrations exceeding 5 mg of F/cu m. The fluorine determination in samples from an aluminum plant area was made by means of the Belcher-West-Sulzberger method, using alizarine complexion and a sodium hydroxide solution as standard solutions.

21342 APTIC NO. 40658

Deswaef, R. and M. Rinaldi

CONTRIBUTION TO THE STUDY OF DIESEL ENGINE EXHAUST-GENERATED AIR POLLUTION. THE NITROGEN OXIDES. *(Contribution a l etude de la pollution atmospherique par les gaz d echappement des moteurs Diesel. Les oxydes d azote.) Text in French. Cent. Belge Etude Doc. Eaux, 24(337):561-567, Dec. 1971. 6 refs.*

Two different methods, developed for the determination of nitric oxide and nitrogen dioxide in exhaust gases, as well as nitrogen oxide concentration measurements on Diesel engines under different conditions are described. Concentrations from a few ppb to 5 ppm can be measured by means of one method with an accuracy of 1%. The sample is bubbled through a series of three bubblers, containing a Saltzman solution and potassium permanganate. The sampling is made at a rate of 400 ml/min until sufficient, fairly stable coloration is obtained. Another modified Saltzman method is directly applicable to all concentration ranges of NO and NO2; the sample is bubbled through a series of four bubblers, of which the first, the second and the fourth contain Saltzman solution, while the third one contains potassium permanganate. The output ranges from 40 to 80%. Concentrations and ratios of NO and NO2 in the exhausts from Diesel engines on a test stand and in a garage were measured. The NO and NO2 concentrations in the exhaust pipe were 500-1300 ppm and 50-100 ppm, respectively. Decreased concentrations with decreased speed of rotation or engine output were observed. The NO2 to total nitrogen oxides ratio ranged from 20 to 25%. The half-life period of NO in 1 ppm and 0.1 ppm concentration was 69 and 690 hours, respectively. The NO/NO2 ratio, measured at a distance of 20 cm of the exhaust pipe was 100 ppm/31 ppm, and 0.99-3.08/0.327-0.95 ppm, when measured at a distance of 3 m.

21343 APTIC NO. 40247

DeWerth, Douglas W.

INFRARED SPECTROGRAPHIC TECHNIQUE FOR ANALYSIS OF FLUE PRODUCTS FROM GAS-FIRED APPLIANCES. *Preprint, American Gas Association Labs., Cleveland, Ohio, 17p., 1971 (?). 7 refs.*

The dispersive infrared spectrophotometric method for measuring trace constituents in flue gases is a laboratory method which has several advantages over currently available traditional air pollution instrumentation. The most important advantage is its ability to measure all components of interest directly and quickly with suitable accuracy from 4 l of flue gas. The instrument also allows for the separate measurement of nitric oxide and nitrogen oxide, rather than one single measurement for NOX. This is important because some authorities feel that there is no need to have emission standards for NOX include NO. The instrumentation consists of a 10-meter folded path gas sample cell and a research grade, dispersive type, double beam, prism-grating IR spectrophometer, providing an absorption spectrum from 2.5 to 25 micron which covers the region of interest in IR gas analysis. Less than 1 hr is required from the time the sample is drawn into the gas cell until the concentrations are calculated for nitric oxide, nitrogen dioxide, carbon monoxide, methane, ethylene, sulfur dioxide, and aldehydes. Calibration and measurement procedures are described.

21344 APTIC NO. 40720

Dmitriev, M. T. and L. D. Pribytkov

IONIZATION-CHROMATOGRAPHY DETERMINATION OF AROMATIC HYDROCARBONS IN THE ATMOSPHERE. *(Ionizatsionno-khromatograficheskoye opredeleniye aromaticheskikh uglevodorodov v atmosfernom vozdukhe). Text in Russian. Gigiena i Sanit., 37(4):74-78, 1972. 9 refs.*

A method developed for the selective ionization-chromatographic determination of aromatic hydrocarbons in the presence of highly saturated hydrocarbon contents in the atmosphere is described. Highly polar stationary phases, containing cyanoethyl groups, were applied for the determination, while nitrilopropionitrile gave the best results. The selectivity coefficient for the above substance was 29.9. Aromatic hydrocarbons such as benzene, toluene, ethylbenzene, n and m-xylenes, and o-xylene in a chemical plant atmosphere were determined on a chromatograph (column length 2 m, diameter 4 mm), provided with a flame-ionization detector. Brick grains of 0.25-0.5 mm were impregnated with 20% of nitrilopropionitrile. The optimim conditions of the determination were: thermostat temperature of 100 C, carrier gas (nitrogen) flow rate 40 ml/min, hydrogen flow rate 40 ml/min, air flow rate 200 ml/min, air sample volume 5-10 l, sampling rate 0.5 l/min, and an analysis time of about 25 min. The sensitivity was 1 microgram/cu m. Saturated hydrocarbons up to n-dodecane did not interfere with the determination. A sampler, suitable for the simultaneous collection of eight samples, and for the concentration of the mixtures, was developed.

21345 APTIC NO. 40396

Dravnieks, Andrew

ODOR PERCEPTION AND ODOROUS AIR POLLUTION. *Tappi, 55(5):737-742, May 1972. 56 refs. (Presented at the Technical Association of the Pulp and Paper Industry, Water and Air Conference, Boston, Mass., April 1-4, 1971.)*

Odor dimensions are intensity, detectability, acceptability, and quality (character). Human response to odors is not linearly related to the concentrations of odorants in air and relates to the chemistry of odorants in a complex way. The response is influenced by criteria which the individuals use to interpret odor sensations and by the form of response expected or accessible, especially in community setting. Trained panels operate with constant criteria but do not reflect the range of the population response. Although the composition and concentrations of odorants in air can be documented analytically, and ultimately the air quality criteria will probably be in analytical terms, odor control planning requires an understanding of the relation between the response and the analytical parameters. Therefore, sensory engineering data are necessary for each type of effluent if the degree of sensory improvement expected from certain changes in the effluent is to be estimated. (Author abstract)

21346 APTIC NO. 40359

Engelhardt, H.

NEW SOLUTION OF PROBLEMS OCCURRING IN THE SAMPLING AND PREPARATION OF GASES FOR AUTOMATIC ANALYZERS. *(Neue Loesungen fuer die bei der Entnahme und Aufbereitung von Messgasen fuer Automatische Analysengeraete auftretenden Probleme). Text in German. Dechema Monograph., 67(1222-1263):215-230 1971. 2 refs.*

Continuous withdrawal of gas samples from process flows for automatic analysis can present very difficult problems. Recently developed cooled sampling probes and heated probes with large surface filters which overcome such problems are discussed as well as performance characteristics of new fine filters and more efficient sample gas coolers operating on the compressor or Peltier principle. If the gas to be measured has a high temperature, a high dust concentration, or contains liquid or pasty slag particles, as in the flue gas from melting chamber furnaces, a sampling probe with water injection is used. The probe contains an injector operated with condensate or calcium-free water for drawing in the gas sample. Gas and water are again separated in a cyclone at the probe exit. The gas sample, liberated of all water-soluble and corrosive dust, is passed to the adjoining analyzer through the overpressure of 400 mm water. Since the carbon dioxide solubility in water is large, this probe cannot be used for CO2 measurements. Another probe suitable for high temperatures, high dust concentrations, and high dew point is steamjacked probe. It operates with indirect cooling by means of a steam-condensate-cooling water cycle. For sampling waste gases from blast furnaces a heated entrance filter is used in the probe. If water vapor interferes with the analysis, water cooling of the sampling gas is inadequate. In this case electric coolers operating either with cooling compressors or by the Peltier principle must be used. Membrane filters of metal which can be easily exchanged are used for dust retention in the sampling probes.

21347 APTIC NO. 40467

Ensor, D. S., R. J. Charlson, N. C. Ahlquist, K. T. Whitby, R. B. Husar, and B. Y. H. Liu

MULTIWAVELENGTH NEPHELOMETER MEASUREMENTS IN LOS ANGELES SMOG AEROSOL. I. COMPARISON OF CALCULATED AND MEASURED LIGHT SCATTERING. *J. Colloid Interface Sci., 38(1):242-251, April 1972. 21 refs*

Mie scattering computations were performed for 212 measured size distributions in Los Angeles smog aerosols. Using a multiwavelength integrating nephelometer, a device which measures the extinction coefficient due to light scattering, measured light scattering at four wavelengths was correlated to the scattering calculated via Mie theory from the measured particle size distributions. A representative scattergram of the measured light scattering versus the calculated light scattering for a hypothetical refractive index of 1.50 used in the computer program is illustrated along with statistics in tabular form. The light scattering of pure air was subtracted from the measured light scattering of the smog aerosol; hence, only the light scattering resulting from aerosol particles was compared. The measured values were higher than those calculated; however, the disparity in magnitude was within the accuracy of the measurement systems. The most important conclusion of the study is the remarkable consistency of the data over the wide range of aerosol concentration and calculation parameters. The correlation coefficient of about 0.9 indicated that approxomately 80% of the total variance in the calculated light scattering coefficients can be associated with individual differences in the measured light scattering coefficients. In essence, this study amounts to a field verification of the validity of Mie theory for natural polydisperse aerosols and to a consistency test of the integrating nephelometer and Minnesota Aerosol Analyzing System employed.

21348 APTIC NO. 40399

Fabian, H. P.

NEW WAYS FOR INTENSIFIED SUPERVISION BY AUTHORITIES OF INDUSTRIAL DUST EMISSIONS. *(Neue Wege zur Intensivierung der behoerdlichen Ueberwachung von industriellen Staubemissionen). Text in German. Luftverunreinigung, 1971:9-12, Dec. 1972. 4 refs.*

Measures and technical solutions for intensified supervision by authorities of industrial dust emissions are suggested. While dust separation presents practically no problem, authorities are not capable of effectively supervising dust emissions, and only a few plants are equipped with recording instruments. Therefore, continuously operating recorders should be installed, and possibly be connected to control units to automatically stop the plant when a definite limit is exceeded. Instead of continuous recorders, the supervisory authorities could be equipped with some simple and reasonably priced dust measuring instruments. A prototype of a relay-controlled sampler, sucking up 500 l of air every 10 min, is being tested. Round-the-clock remote supervision, applying television and other electro-optic techniques, represents the ideal solution. Such systems, either stationary or mobile, should react upon emissions far above the limit value. A system for transmission measurements for flue gas plumes is described.

21349 APTIC NO. 40713

Galkov, G. P., S. F. Pavlov, and V. P. Kozyrev

RECONSTRUCTION OF THE MINE ASPIRATOR AREA FOR SIMULTANEOUS COLLECTION OF SEVERAL SAMPLES OF AIR. *(Rekonstruktsiya avtomaticheskogo ezhektornogo rudnichnogo aspiratora (AERA) dlya odnovremennogo otbora neskol kikh prob vozdukha). Text in Russian. Gigiena i Sanit., 37(4):84-85, 1972. 2 refs.*

An improved model of the automatic AREA ejector type mine aspirator, designed for the simultaneous collection of several air samples in places with fire or explosion hazards, is described. The instrument cover is provided with four dry type rheometers for the fine adjustment of sampling rates from 0.1 to 20 l/min. A manifold, connected to the suction nipple instead of the dust sampling tube, is connected to the above rheometers across rubber hoses. A 2-liter pressure tank, containing compressed air or nitrogen under a pressure of 150-200 atm provides continuous operation over 2 to 3.5 hr. The device is portable, reliable, and suitable for sampling under any conditions.

21350 APTIC NO. 40364

Gannoe, R. E., G. R. Riley, and D. W. Frink

GAS MONITORING EQUIPMENT INVESTIGATION. (INTERIM REPORT). *Battelle Memorial Inst., Columbus, Ohio, Columbus Labs., Navy Ship Systems Command Contract N00014-69-C-0352, 115p., 1971. 12 refs.*

NTIS, DDC: AD 730509

Instrumentation and techniques for monitoring the essential and potentially harmful gases contained in a diver's breathing system with possible applications to air pollution monitoring are examined. Based on a study of diving requirements, the constituents selected for monitoring included oxygen, carbon dioxide, carbon monoxide, relative humidity (water vapor), hydrocarbons, nitrogen oxides, sulfur dioxide, and halogen compounds, e.g., carbon tetrachloride, trichloroethylene, methylene chloride, bromides, and iodides. The formation and physiological effects of these constituents were examined and toxic concentrations and tolerances were established. Measuring methods included mass spectrometry, colorimetric methods, ultraviolet and infrared spectrophotometry, and gas chromatography. Applicable gas monitoring techniques examined included electrolytic cells, paramagnetic sensors, volume absorption, colorimetric tubes, electrochemical-porous membrane, infrared absorption, photoelectric phenomena determinations, hygrometers, flame ionization detectors, coulometric systems, ultraviolet photometers, electrochemical cells, electrolyte conductivity measurements, ionization chambers, and pyrolysis. Manufacturers, detection principles, sensitivity, scale ranges, accuracy, response time, power requirement, ambient temperature limitations, output, intended applications, physical characteristics, costs, calibration, and pressure requirements were calculated.

21351 APTIC NO. 40804

Gerstle, R. W. and D. J. Henz

ADMINISTRATIVE AND TECHNICAL ASPECTS OF SOURCE SAMPLING FOR PARTICULATES. (FINAL REPORT). *PEDCO - Environmental Specialists, Inc., Cincinnati, Ohio, Environmental Protection Agency Contract CPA 70-124, Rept. APTD-0754, 135p., June 7, 1971. 15 refs.*

NTIS: PB 203502

The technical and administrative aspects of establishing and conducting a source sampling program within an air pollution control agency are presented. Administrative aspects include legal aspects, organization, personnel and equipment needs, and costs. Technical aspects and a detailed explanation of conducting a source sampling test for particulate matter are described. Sources of error and the magnitude of errors are included. (Author abstract)

21352 APTIC NO. 40481

Gladen, R.

THE DETERMINATION OF CARCINOGENIC POLYCYCLIC AROMATIC HYDROCARBONS IN AUTOMOBILE EXHAUST GASES BY COLUMN CHROMATOGRAPHY. *(Die Bestimmung cancerogener polycyclischer aromatischer Kohlenwasserstoffe im Kraftfahrzeugabgas durch Saeulen-Chromatographie). Text in German. Chromatographia, vol. 5:236-241, 1972. 11 refs.*

A process is described for determining 12 polycyclic hydrocarbons in automobile exhaust gases by separation in a chromatographic column and subsequent quantitative ultraviolet photometry. In contrast to other methods, no special purification of the condensed exhaust components is necessary. The solution of the test specimen in cyclohexane is merely treated with potash solution to remove acid components. The chromatography is carried out in a Sephadex LH 20 column with isopanol as the eluting agent. The unwanted exhaust gas components are eluted before the polycyclic hydrocarbons to be determined, the latter being distributed between eight fractions. The important benzo(a)pyrene forms a fraction by itself and is very well separated from benzo(g,h,i) perylene. Benzo(g,h,i)perylene possesses an extremely similar ultraviolet spectrum and could, therefore, interfere with the determination of benzo(a)pyrene. An application of the method, the separation and quantitative determination of polycyclic hydrocarbons in the exhaust gases of a small single cylinder test engine is demonstrated. (Author summary modified)

21353 APTIC NO. 40374

Gnyp, A. W., S. J. W. Price, C. C. St. Pierre, and J. Steiner

PROBLEMS IN STACK SAMPLING: PART 1--TRAINED PERSONNEL. *Water Pollution Control (Toronto), 110(4):72-74, April 1972.*

In 1969-70, efforts of the University of Windsor stack sampling team of the Industrial Research Institute were devoted to the acquisition and evaluation of literature, primarily on stack testing procedures and factors affecting stack sampling. In 1971-72 the research team is concentrating on remaining knowledgeable on the current state of technology associated with stack sampling for particulate and gaseous pollutants. The works covers updating and evaluating literature on sampling and monitoring stack effluents, initiating a new literature search devoted to exotic pollutants such as heavy metals and chlorinated hydrocarbons, and initiating a non-experimental investigation of the parameters required for the development of a practical particle size analysis technique that would be applicable to on-site stack testing procedures. The initial goal of the 1972-73 research program is to carry out laboratory investigations of the instruments and testing procedures indicated as worthy of further consideration. A pressing need was found for the organization of a comprehensive training program for industrial and control agency personnel concerned with air pollution problems.

21354 APTIC NO. 39977

Gogol, N. A. and G. D. Smirnova

DETERMINATION OF NITRIC OXIDE BY MEANS OF PHOTOCOLORIMETRY. *(Opredeleniye okisi azota fotokolorimetricheskim metodom). Text in Russian. Izv. Akad. Nauk Kaz. SSR, Ser. Khim., no. 1:60-63, Jan.-Feb. 1972. 16 refs.*

The applicability of a colorimetric method to the determination of nitric oxide concentrations in gaseous mixtures containing no oxygen by means of ferrous chloride and ferrous sulfate was investigated. The method has the advantage of being rapid, since the need for the oxidation of the NO is eliminated. The NO, obtained from sodium nitrate, was mixed to argon, and the gaseous mixture was added to the absorbing solution made of ferrous chloride or sulfate with high accuracy. The concentration of the ferrous salt solution was varied within a wide range; from 1% to saturation at 20 C, according to the NO concentration. The light absorption was measured by means of green filter, and calibration curves were determined for known concentrations. Linear function of the optic density was observed for low NO concentrations up to 0.4%. Ferrous chloride was the best reagent for the above procedure. The method has a fairly good reproducibility with a relative error of 5-10%. The method showed good accordance with other techniques.

21355 APTIC NO. 40332

Green, A. E. S., A. Deepak, T. Sawada, and R. S. Sholtes

REMOTE SENSING OF ATMOSPHERIC AEROSOLS. *Michigan Univ., Ann Arbor, Center for Remote Sensing Information Analysis and Environmental Protection Agency, Washington, D. C., Water Quality Office, Proc., Symp. Remote Sensing Environ., 7th, Ann Arbor, Mich., 1971., vol. 3:1749-1763. 15 refs. (May 17-21.)*

Developemnt of a simple method for the remote measurement of size altitude distributions of atmospheric aerosols, based on measurements of the sky brightness intensities within the sun s aureole, is described, including instrumention and data processing of the remote sensing system. The inversion of scattering data is carried out by comparing the angular distribution of the forward scattered sunlight with the results of theoretical calculations. The calculations allow for Lorenz Mie scattering by a size-altitude distribution characterized by simple analytic models for the aerosols. In situ measurement of the size-altitude distribution using an instrumented light aircraft were made to validate the study. A forward scatter particle counter-sizer was used to measure the aerosol size-altitude distribution. The results of both remote and in situ measurements conducted over Gainesville, Fla. in April 1971 during a general air pollution alert over Florida and Georgia are presented.

21356 APTIC NO. 39903

Guerin, H.

APPLICATION OF PHYSICAL METHODS TO GAS ANALYSIS. *Chim. Anal. (Paris), 47(10):495-501, Oct. 1965. 14 refs. Translated from French by G. A. MacDonald, British Iron and Steel Industry Translation Service, London (England), 14p., Aug. 1970.*

Methods for gas analysis based on physical measurements are particularly suitable for continuous measuring and for determining trace elements. Regarding such methods not employing separation, the following are discussed: determination of density or associated properties, measurements of thermal conductivity, exploitation of electrical and, in particular, magnetic properties, and spectroscopy. The gas-density type measuring instruments may operate in a variety of ways, such as the balancing of a thrust of gas by an electrostatic force, the cooling by a carrier gas of two hot-wire flowrmeters inserted on both sides of a wheatstone bridge, or the measuring of the phase difference resulting from sounds made by different gases of unequal density. Thermal conductivity analyses depend essentially on the speed at which the heat released by a filament is transmitted to the wall of a gas-filled cell by conduction. Such instruments are strictly suitable for binary gas mixtures with the exception of a device called the Thermatron, which is capable of analyzing ternary mixtures. Applications using magnetic susceptibility are limited in practice to oxygen determination. There are two types of equipment based on this principle: those which make direct measurements of the force produced by the magnetic field and those which utilize the resultant magnetic wind. Spectroscopic analysis, utilizing visible and ultra-violet light make possible the determination from 0.005 to 0.25% chloride or nitrogen dioxide, and by using a quartz filter (3050 to 3200 A), corresponding contents of sulfur dioxide analyzers are also mentioned. Physical separations may involve either a change of state or a chemical reaction. These include gas chromatography, various hygrometers, colorimetry, the Phillips cell, devices based on frequency variation in a quartz crystal, trace analysis of chlorine, SO2, or hydrogen sulfide, absorption methods, conductivity or colorimetry methods, and electric analyzers. A process for the difficult determination of indirect traces of hydrogen in electrolytic chloride is mentioned. Other methods utilizing reaction and conductivity, absorption and coulometry, and pyrolysis of the product to be determined (or its reaction with a suitable reagent) along with measurement of ionic conductivity are also described.

21357 APTIC NO. 40061

Guicherit, R., R. Jeltes, and F. Lindqvist

DETERMINATION OF THE OZONE CONCENTRATION IN OUTDOOR AIR NEAR DELFT, THE NETHERLANDS. *Environ. Pollut., 3(2):91-110, April 1972. 25 refs.*

The most widely used method for the analysis of atmospheric total oxidants is the neutral-buffered potassium iodide method, which is accepted as the reference method for ozone determination under laboratory conditions and for calibration purposes. Because this method is not specific for ozone, several more specific ozone measuring techniques have been tested and developed by the Research Institute for Public Health Engineering TNO at Delft. These include the chemiluminescent reaction between ozone and Rhodamine B, the spectrophometric indigosulphonic-acid method, based on the bleaching activity of ozonized air on a neutral-buffered solution of this acid in water, and a galvanic detection method which has been made highly selective for ozone. The manual spectrophotometric determination of ozone with di-(pyridyl) ethylene, which is also clamed to be specific, proved to be unreliable, while commercially-available Mast-meters are essentially total oxidant meters and not ozone detection devices. Ozone determinations in outdoor air indicate that smog-forming conditions occur in this part of The Netherlands. During 1969 and 1970, 25 days occurred during which ozone values of more than 200 micrograms/cu m were recorded. Data of outdoor air measurement for oxides of nitrogen, hydrocarbons, and aldehydes support this point of view. (Author abstract)

21358 APTIC NO. 40700

Gundelach, V. G.

CONTRIBUTION TO THE AUTOMATIZATION OF ANALYTICAL MEASUREMENTS, STATE OF THE ARTS AND FUTURE TRENDS. *(Zur Automatisierung analytischer Messungen, Stand und Entwicklungstendenzen). Text in German. Dechema Monograph., 67(1222-1263):57-87, 1971. 20 refs.*

The different stages of development in the automation of analytical measurements and instrumentation are reviewed. Mechanization of manual operation, the first step toward automatization, results in raw data only, requires simple computation. When such functions ar taken over by suitable components, the first stage of automation is reached (for example, thermomagnetic oxygen measurement with air pressure correction, linearization circuit, and direct calibration in percent of oxygen). Small computers are applied for the automation of more complicated computation representing the second stage of automation. Here, the critical evaluation of the measurement data, as well as decisions between options are taken over by the computer. The final step is full automation, where the system is influenced by a large-capacity computer which uses programmed decisions. The performance is limited by economic considerations, while the realization is often dependent on the availability of adequate software. The extend of the analytical system covered by automation ranges from sampling to analysis and finally to evaluation. While gas and liquid sampling procedures ar only mechanized in want of software, the developments in solid sampling are considerable. The bulk of the on-line analytic instrumentation already achieved is covered by the first stage of automation, and on-line chromatographs with computers applying test programs and automatic evaluation represent the highest stage in this area. Laboratory analyzers for routine tests are mechanized, and automatic titration is being developed. Element analysis procedures are automated from incineration to signal recording, while spectrophotometers have been developed to the second stage of automation. Mechanized analytic lines can reach the second stage of development. Large-scale physical analyzing instruments (spectrometers, X-ray diffractometers, X-ray fluorescence spectrometers, mass spectrometers, nuclear-resonance and electron spin resonance spectrometers), combined with a single large capacity computer or several small computers, represent the highest stage of automation.

21359 APTIC NO. 39884

Gurov, F. I. and Yu. V. Novikov

FLUORIMETRIC SPECTROGRAPHY OF POLYCYCLIC AROMATIC HYDROCARBONS IN SNOW AND SOIL SAMPLES. *(Opredelenie politsiklicheskikh aromaticheskikh uglevodorodov spektral no-lyuminestsentnym metodom v probakh snega i pochvy). Hyg. Sanit. (English translation from Russian of: Gigiena i Sanit.), 36(3):409-413, March 1971. 6 refs.*

NTIS: TT 71-50122

For the determination of various polycyclic aromatic hydrocarbons in snow and soil, several samples were collected from a number of areas in Moscow, then examined for their fluorescence spectra. Numerous quasi-lines coinciding with the spectrum lines of 3,4- benzpyrene, 1,12-benzperylene, pyrene, and anthracene in n-hexane were identified. Traces of perylene and coronene were found. Variations were found in samples collected from different areas of the city. Fluorimetric spectrography is indicated as a useful method for determining polycyclic aromatic hydrocarbons.

21360 APTIC NO. 40299

Haagen-Smit, A. J.

CHEMICAL ANALYSIS OF AIR POLLUTANTS. *Interdepartmental Committee on Air Pollution, Washington, D. C., Air Pollut., Proc. U. S. Tech. Conf., Washington, D. C., 1950, p. 193-195. (May 3-5, Louis C. McCabe, ed.)*

Analysis of air pollutants is complicated by the presence in most cases of only very small amounts of material in a large volume of air, and by the state in which the pollutants occur as gases, solid particles, and liquid droplets of greatly different sizes. The sampling technique of cooling the air and freezing out the volatile material is very useful when combined with adsorption techniques using charcoal or silica gel. Scrubber techniques used with specific reagents are useful for isolating special groups of substances, but present difficulties when less specific reactions are used or when groups of substances are determined on the basis of their oxidation or reduction powers, or their acidity. Examples from the study of oxidizing compounds in the Los Angeles air are given. The exceedingly complex material released into the air such sources as petroleum products, industrial solvents, and garbage burning are further changed through oxidation and polymerization when subjected to sunlight, air, and water. Interpretation of analytical results of hydrocarbons and other organic compounds should be made with caution and should consider the possibility of conversions of the original products as well as the interaction of the components. Separation of organic compounds by chromatographic analysis is discussed briefly.

21361 APTIC NO. 39938

Haaland, Harold H. (ed.)

METHODS FOR DETERMINATION OF VELOCITY, VOLUME, DUST AND MIST CONTENT OF GASES. *Joy Manufacturing Co., Los Angeles, Calif., Western Precipitation Div., Bull-WP-50, 38p., 1970.*

A standard procedure, the Dust Concentration Method, is detailed fo measuring the concentration and character of solids or liquids in the form of a dust, mist, or fume carried by gas streams contained in industrial flue systems. Basically, the gas volume is first measured and then the weight of suspended matter carried by a unit volume of gas is determined. A range of sampling methods is included. The Balanced Tube Method, in which the amount of suspensoids is measured without necessarily measuring the gas volume, is also described. Instructions are given for determining the velocity of the gas stream itself by means of a Pitot tube or anemometer, for calculating gas volume, and for wet bulb and dry bulb temperature readings. Such testing is applicable to determine the performance of an existing gas handling or gas cleaning system, to evaluate the need for installing a cleaning system, or to obtain information for the design of such a system.

21362 APTIC NO. 39962

Hart, H., D. Friesecke, and G. Knorr

IMPROVING THE SENSITIVITY OF INFRARED GAS ANALYZERS. *(Empfindlichkeitserhoehung von Infrarot-Gasanalysengeraeten). Text in German. Mes. Steuern Regeln, 13(9):330-333, Dec. 1970. 15 refs.*

General principles for improving the selectivity of nondispersive infrared gas analyzers, and experiences gained with an instrument of improved sensitivity are described. Since an increase in either the radiation power or sensitivity of the receiver is not applicable, the sensitivity can be improved, without affecting the signal/noise ratio, by increasing the absorption in the cuvette. This is possible by increasing the absolute pressure or the irradiated layer thickness. Increasing the layer thickness by applying multiple reflection has certain disadvantages, while the size of the cuvette is limited by that of the instrument. Thus, the absolute pressure should be increased. Experiments carried out with carbon dioxide, carbon monoxide, and a methane in a pressure type cuvette, in a concentration range of 0-2000 ppm, showed a nearly linear improvement in sensitivity with increasing pressure. The improvement was strongly dependent on the gas analyzed, i.e., the variation of the absorption coefficient. The increased pressure did not affect the selectivity of the instrument.

21363 APTIC NO. 40263

Hauck, Helger

DETERMINING THE PARTICLE SIZE DISTRIBUTION OF THERAPEUTIC AEROSOLS BY MEANS OF A KONIMETRIC DEVICE. *(Bestimmung der Teilchengroessenverteilung von Dosieraerosolen mit einer Konifuge). Text in German. Aerosol Sci., vol. 3:31-37, 1972. 6 refs.*

The particle size distribution of three different therapeutic aerosols was determined by means of a konimeter. The konimeter was calibrated by polystyrol latices above 2 micron diameter with paraffin aerosols. The aerosol spray, to which pure air was added at a rate of 20 l/min, was sucked up by the konimeter isokinetically. The size distribution of the aerosols of the active material particles was obtained by an electron microscope. The size distribution was converted to mass distribution, and mean diameters of 4.1, 4.9, and 3.8 micron were obtained. The results were interpreted regarding the retention by different sections of the respiratory tract. While the optimum efficiency with maximum possible retention is generally found in the tracheobronchial section, retention in the alveolar section may be undesirable. The aerosol of 3.8 micron may reach the alveolar section in a larger proportion than that of 4.9 micron. The 4.1 micron aerosol, having a wide size distribution, reaches an extended portion of the respiratory tract.

21364 APTIC NO. 40543

Heffelfinger, R. E., C. W. Melton, and D. L. Kiefer

DEVELOPMENT OF A RAPID SURVEY OF SAMPLING AND ANALYSIS FOR ASBESTOS IN AMBIENT AIR. (FINAL REPORT). *Battelle Memorial Inst., Columbus, Ohio, Columbus Labs., Environmental Protection Agency Contract CPA 22-69-110, Rept. APTD-0965, 34p., Feb. 29, 1972. 5 refs.*

NTIS: PB 209477

A methodology for the determination of asbestos fiber and fibril content of particulate samples collected near a point source, in urban ambient air, and in a remote rural site is examined. Asbestos particles in the range of 0.01-10 millimicron were sampled. Ashing and sometimes centrifuging were necessary to beneficiate asbestos particles. Ultrasonification provided a means for redistributing the asbestos particles uniformly and in countable frequency. A magnification of 30,000 diameters is optimum for the identification 0by morphology of the various forms of asbestos by transmission electron microscope. On the basis of cross check analysis, the data appear to be reliable within plus or minus 30% of the stated amount.

21365 . APTIC NO. 39793

Henderson, J. S.

PLANNING FOR AIR POLLUTION CONTROL. II. AMBIENT AIR SAMPLING. *Glass Ind., 51(7):307-311, July 1970. 17 refs.*

Air sampling instrumentation includes high-volume air samplers, open-topped dustfall containers, the haze coefficient sampler, sulfur dioxide monitors, and wind sensors. Capital and operating costs and manpower requirements are given. Data reduction and analysis are discussed. Self-timing samplers normally do not provide an immediate and direct readout of pollutant levels; rather the samples must be gathered manually and analyzed in a laboratory. Compared to the automated instruments, these units require lower capital investment, less skilled operators, and a minimum of shelter. The static samplers require a minimum of both capital and manpower investment, since no electric power is necessary, and results are produced by simple exposure to the atmosphere. A number of techniques can be used to minimize sampling costs and maximize data output. If a number of plants must be monitored, a centralized laboratory facility provides economy. Mailable samplers include suspended particulate filters, sequential bubblers, dustfall containers, adhesive cylinders, haze tapes, and sulfation candles or petri dishes. Proper application of the various samplers can result in accurate data at a minimum cost.

21366 APTIC NO. 39929

Hendrickson, E. R.

AIR POLLUTION SAMPLING AND ANALYSIS WITH SPECIAL REFERENCE TO SULPHATE PULPING OPERATIONS. *Tappi, 42(5):173A-176A, May 1959. (Presented at Gulf Coast Section, Technical Association of the Pulp and Paper Industry, Mobile, Ala., March 13, 1959.)*

A sulfate mill developed a stack sampling program to determine emissions of particulates, sulfur dioxide, hydrogen sulfide, and total from the recovery furnace. The sampling train consisted of a probe containing a Whatman paper thimble, fritted glass scrubbers, flow-measuring devices, and a compressed-air ejector as a source of vacuum. Sampling was conducted at the rate of 0.1-0.3 cfm for as long as 1 hr. Sulfur dioxide was analyzed by the West and Gaeke method, H_2S by the Fogo and Popwosky method, and particulates by drying the loaded filter in a desiccator to constant weight and weighing. Preliminary results indicate that these techniques and procedures have considerable merit and are worthy of further investigation. In areal sampling, the cost of obtaining continuously several hundred simultaneous collections may be prohibitive. One satisfactory approach is to obtain cumulative indications over a period of time by simplified techniques. The unit cost of such techniques is insignificant compared with more elaborate procedures and equipment. These techniques include fallout pans and jars, adhesive paper, and greased slides for aerosols; the lead peroxide candle method for SO_2; and lead acetate-impregnated papers or tiles for H_2S.

21367 APTIC NO. 40375

Hill R., J. H. Holt, and B. Miller

RAPID TEST PAPER METHODS FOR HYDROGEN CYANIDE IN THE ATMOSPHERE. *Ann. Occupational Hyg., 14(4):289-294, Dec 1971. 3 refs.*

Because the use of o-tolidine is now restricted under the Carcinogenic Substances Regulations, 1967 simple alternatives were sought to the O tolidine/copper acetate paper test for the detection of hydrogen cyanide in the atmosphere. Two satisfactory paper tests, one treated with N,N(prime)diethyl-p-phenylenediamine sulfate and copper acetate and the other with p-nitrobenzaldehyde and potassium carbonate, are described. On exposure to 10 ppm hydrogen cyanide for 5 sec, the former produces a pink stain and the latter a reddish purple stain. The p-nitrobenzaldehyde test paper is preferred as it is not subject to interference from chlorine, ammonia, or nitrogen peroxide. Preparation of the test atmospheres, stability of the reagent, sensitivity, procedures, and results of both methods are compared. (Author abstract modified)

21368 APTIC NO. 40446

Hinohara, Keiichi

SMOKE INDICATOR. *(Baien nodokei ni tsuite). Text in Japanese. Nenryo Oyobi Nensho. (Fuel and Combustion), 38(10):1001-1007, Oct 1971.*

Measurement of smoke concentration by comparing the factory stack gas to standard indicators such as Ringelmann or Roberts ratings has the disadvantages of uncertainties due to the differences of time, weather, and observer. Measurement by determining the light transmission through the smoke is a widely applied method. The apparatus can either be equipped in the stack or in a detector to which the flue gas for test is introduced. The smoke concentration can be measured continuously by this method. However, it is difficult to protect the detector from dirt and, since the concentration is measured as g/cu n m, it is largely affected by temperature and pressure condition. The light transmission is also affected by the size, the shape, the specific gravity, and the color of the particulates. For a small amount of smoke, the measurement is usually conducted by separating the smoke from flue gas. Typical examples were described graphically for each method.

21369 APTIC NO. 40221

Hodgeson, J. A., B. E. Martin, and R. E. Baumgardner

COMPARISON OF CHEMILUMINESCENT METHODS FOR MEASUREMENT OF ATMOSPHERIC OZONE. *Progr. Anal. Chem., vol. 5, 17p., 1971. 10 refs.*

Three different chemiluminescent techniques used for the measurement of atmospheric ozone are discussed and compared. Regener s procedure measures a chemiluminescent emission from reaction of ozone with Rhodamine-B adsorbed on activated silica gel. An automated instrument which uses this principle is described. Two gas-phase chemiluminescent reactions have recently been proposed for ozone measurement. Nederbragt and Warren used an atmospheric pressure chemiluminescent reaction between ozone and ethylene. Preliminary data on response characteristics of a similar detector are given. The low pressure chemiluminescent reaction between nitric oxide and ozone has been used by Fontijn in a prototype detector for the measurement of nitric oxide. With minor modifications, the same device can be used for the measurement of ozone. The three techniques are compared in terms of sensitivity, linear calibration range, response time, interferences, and complexity. While all three techniques meet the requirements of a satisfactory atmospheric monitor, the Nederbragt detector is advantageous in terms of simplicity, ease of operation, and size.

21370 APTIC NO. 40376

Hounam, R. F.

THE KONIMISER--A DISPENSER FOR THE CONTINUOUS GENERATION OF DUST CLOUDS FROM MILLIGRAM QUANTITIES OF ASBESTOS. *Ann. Occupational Hyg., 14(4):329-335, Dec. 1971. 4 refs.*

A dispenser was designed to generate dust clouds from any sample of asbestos with a high proportion of fibers in the respirable range and to be operated in conjunction with an exposure chamber holding four rats. To prevent overloading the mucociliary clearance mechanisms of the respiratory tract, dust concentrations were not allowed to exceed 20 micrograms/l; under these conditions it is clear that a consumption rate of only a few milligrams/l asbestos is required. As the dispenser works by a process analogous to atomization and disperses quite small amounts of asbestos into an air stream with reasonable efficiency to provide respirable airborne dust, it is called a Konimiser. Design, construction, operation, and performance of the dispenser are discussed.

21371 APTIC NO. 40116

Ingram, M.

INVESTIGATION OF ERRORS ARISING IN IODOMETRIC DETERMINATION OF FREE SULPHUROUS ACID BY THE ACETONE PROCEDURE. *J. Soc. Chem. Ind., vol. 66:105-115, April 1947. 7 refs.*

Apart from difficulties in the observation of the end-points, errors arise in the iodometric determination of free sulfurous acid by the acetone procedure because the determinations involve disturbance of the equilibrium between free and combined sulfur dioxide, leading to production of more free SO_2. The change following dilution is not rapid enough to cause serious error. The change following removal of all the free SO_2 by titration with iodine is rapid enough to be troublesome in accurate work. Addition of 20% acetone does not take up all the free SO_2 in a reasonable time, but allowance can be made for this error. The most serious defect lies in the fact that with some juices (perhaps those damaged by overheating) the acetone titration does not correctly measure the reducing power of the components of the juice other than SO_2, and the difference may be equivalent to an over-estimate of free SO_2 by as much as 50 ppm. It is thus dangerous to apply iodine titration indiscriminately as a measure of ascorbic acid in citrus juices. (Author abstract modified)

21372 APTIC NO. 40807

Innes, W. B.

SELECTIVE CATALYTIC COMBUSTION SENSORS FOR REACTIVE ORGANIC ANALYSIS. *Preprint, American Chemical Society, Washington, D. C.; American Inst of Aeronautics and Astronautics, New York; Environmental Protection Agency, Washington, D. C.; Inst of Electrical and Electronics Engineers, New York; Instrument Society of America, New York; National Aeronautics and Space Administration, Washington, D. C.; and National Oceanic and Atmospheric Administration, Washington, D. C., 3p., 1971. 3 refs. (Presented at the Joint Conference on Sensing of Environmental Pollutants, Palo Alto, Calif., Nov. 8-10, 1971, Paper AIAA 71-1088.)*

Sensors involving a vanadia-alumina catalyst bed-thermocouple assembly satisfy requirements for simple, reproducible and rapid continuous analysis of reactive organics. Responses generally increase with temperature to 400¼C and increase to a maximum with flow rate/catalyst volume. Selectivity decreases with temperature. Response time decreases with flow rate and increases with catalyst volume. At chosen optimum conditions calculated response which is additive and linear agrees better with photochemical reactivity than other methods for various automotive sources, and response to vehicle exhaust is insensitive to flow rate. Application to measurement of total reactive organics in vehicle exhaust as well as for gas chromatography detection illustrate utility. The approach appears generally applicable to high thermal effect reactions involving first order kinetics. (Author abstract)

21373 APTIC NO. 40300

Jacobs, Morris B.

METHODS FOR THE DIFFERENTIATION OF SULFUR-BEARING COMPONENTS OF AIR CONTAMINANTS. *Interdepartmental Committee on Air Pollution, Washington, D. C., Air Pollut., Proc. U. S. Tech. Conf., Washington, D. C., 1950, p. 201-209. 33 refs. (May 3-5, Louis C. McCabe, ed.)*

A new method for evaluating sulfur dioxide in the presence of sulfur trioxide, based on the insolubility of lead sulfite in acetic acid, is described. The air to be tested is passed through a solution of lead acetate in acetic acid. The sulfite is trapped along with the SO_3 as lead sulfite and lead sulfate, respectively. The former is more insoluble than the latter and forms a turbidity which is stable for considerable periods of time. This can be measured in a photoelectric colorimeter or in a spectrophotometer at 600 micron. In addition, methods of sampling and analysis for the separation of numerous organic and inorganic sulfur compounds present in polluted air are briefly described. Sulfur trioxide, sulfuric acid, sulfates, and free sulfur can be trapped by an acid- free filter paper while SO_2 and hydrogen sulfide will pass through. The SO_3 can then be estimated titrimetrically as H_2SO_4. Total sulfate can be determined with barium, and after subtraction of the amount of acid, the amount of sulfate can be ascertained. Free sulfur can be detected and estimated by the thallium polysulfide test and by a variation of the mercury test. Various methods for estimating SO_2 distinguish it from SO_3 and H_2S, the latter can be estimated by the cadmium sulfide and bismuth sulfide methods, by the silver cyanide detector, and by other methods. The reaction with iodide and the bleaching of dyes by peroxydisulfates is suggested as a means for their detection. Several other methods are noted.

21374 APTIC NO. 39982

Jaenicke, R.

COMMENTS ON THE GENERATION OF POLYSTYRENE BEAD AEROSOLS. *Aerosol Sci., 2(4):401-404, 1971. 8 refs.*

The design and operation of an aerosol generator that produces polystyrene bead aerosols of known size distribution and particle properties for calibration of optical particle counters are examined. The flow of polystyrene hydrosol into the atomizer is controlled by a thin stainless steel capillary. The fine aerosol from droplet residues is removed by a glass bead diffusion column. Any aerosol escaping from the apparatus would be an air pollution problem.

21375 APTIC NO. 40000

Kaldor, Andrew, William Bruce Olson, and Arthur G. Maki

POLLUTION MONITOR FOR NITRIC OXIDE: A LASER DEVICE BASED ON THE ZEEMAN MODULATION OF ABSORPTION. *Science, 176(4034):508-510, May 5, 1972. 3 refs.*

The concentration of nitric oxide can be monitored by a new device in which the Zeeman effect is used to shift an absorption line of nitric oxide into coincidence with a laser line of carbon monoxide. The absorption is modulated by a small, oscillating magnetic field. This device is specific for nitric oxide and is not subject to interference from other gases. (Author abstract)

21376 APTIC NO. 39873

Katz, Morris

THE PHOTOELECTRIC DETERMINATION OF ATMOSPHERIC SULFUR DIOXIDE BY DILUTE STARCH-IODINE SOLUTIONS. *Interdepartmental Committee on Air Pollution, Washington, D. C., Air Pollut., Proc. U. S. Tech. Conf., Washington, D. C., 1950, p. 580-595. 19 refs. (May 3-5, Louis C. McCabe, ed.)*

Methods of determining sulfur dioxide in air are reviewed. A continuous, automatic analyzer for sulfur dioxide which employs photoelectric cells and a recording potentiometer to indicate the increase in light transmission of stable, blue, starch-iodine solutions after aspiration with contaminated air is described. The method is specific for sulfur dioxide in smelter areas where hydrogen sulfide is not likely to occur. The instrument has a range of less than 0.01 to 1.0 ppm or more, depending upon the volume and concentration of the solution in the absorbers and the amount of air sample passed through the solution. The results of a large number of simultaneous observations by the starch-iodine and conductivity methods during field fumigations are grouped according to the character of the fumigations into heavy, medium, and mild smoke visitations. The results of 15 heavy smoke visitations with an average of 1.096 ppm of total sulfur contaminants indicated that the sulfur dioxide component represented 86.6% of the total.

21377 APTIC NO. 40763

Kercher, H.

A NEW DEVICE FOR DUST RESISTANCE MEASUREMENTS. *(Ein neues Geraet zur Staubwiderstandsmessung). Text in German. Brennstoff-Waerme- Kraft, 21(1):24-28, Jan. 1969. 11 refs.*

Methods and devices for measurement of the resistivity of dusts are reviewed, and comparative measurements carried out with a new Maihak/Lurgi apparatus are described. In this device, the dust applied electrostatically or manually (in the case of low concentrations) between test electrodes is tested by means of high voltage, and ohmmeter reading multiplied by a constant (10 sq cm/cm) gives the resistivity. Both gas humidity and temperature can be checked during measurement. The instrument can be inserted in both gas canals or test chambers. A temperature rise from 25 to 140 C first caused a rapid increase in the readings, reaching a maximum at 80 C. Rapid response of the readings to variations in humidity was observed. A dew point shift from 10 to 35 C at 80 C gas temperature caused the resistivity to drop to about one-tenth. The effect of the layer thickness was negligible once the measuring gap filled with dust. While the effect of the bulk density of dusts with high resistivity was not significant, increased densities caused this effect to recede rapidly in dusts with low resistance. The different dust samples investigated showed specific dependence on the test voltage. A voltage of about 100 was found best. Compared with readings obtained by other methods and instruments, the readings of the Maihak/Lurgi instrument were closest to the real resistivity of dust layers as separated by industrial filters. In addition to the absence of creeping currents, repeated measurements under various conditions are possible.

21378 APTIC NO. 40228

LaMer, Victor K.

THE PRODUCTION AND MEASUREMENT OF THE PARTICLE RADIUS OF VERY, FINE MONODISPERSE SULFURIC ACID AEROSOLS. *Interdepartmental Committee on Air Pollution, Washington, D. C., Air Pollut., Proc. U. S. Tech. Conf., Washington, D. C., 1950, p. 167-168. (May 3-5, Louis C. McCabe, ed.)*

A study is summarized in which fine sulfuric acid mists were prepared with a LaMer-Sinclair homogeneous aerosol generator, in order to develop improved methods for measuring the size and concentration of liquid aerosol droplets in the 0.01 to 0.08-micron range. Aerosols of 99% H2SO4, when exposed to H2SO4 solutions of higher water content, absorb water and grow to a size such that the aqueous tension of the droplet equals that of the master solution to which it is exposed. Particles are grown to a size that can be measured by established optical methods. Similar behavior is exhibited by dibutyl phthalate aerosol droplets when exposed to the vapors of volatile solvents, and theoretically should extend to all liquid aerosols. Although measurement after an 8-fold growth in radius is possible, for 99% H2SO4, a 5-fold growth is recommended since the smaller the growth, the more reliably it can be controlled. The number and radii of the grown sulfuric acid droplets were determined by the optical transmission method; calculations agreed satisfactorily with filter deposit measurements. The range and reliablity of the transmission method were improved by deriving new functions to give characteristic maxima and minima in more desirable ranges of droplet radii. The smallest radius measured by the growth method is about 0.01 micron although smaller sizes of the order 0.006 micron are detectable, and these sizes can be estimated crudely. (Author conclusions modified)

21379 APTIC NO. 40620

Landry, M. J. and J. R. Lochner

LASER LIGHT DETECTING AND RANGING (LIDAR) SYSTEMS GB-60A AND GB-60B. *Sandia Labs., Albuquerque, N. Mex., 130p., Sept. 1968. 20 refs.*

NTIS: SC-DR-67-850

A light detecting and ranging system (lidar) for locating and tracking ablation clouds from a Systems for Nuclear Auxiliary Power, SNAP, device is being developed. The first generation lidar, GB-60A, uses a Q-switched ruby laser detected daytime cloud reflections at 26 mi and nighttime reflections at 43 mi in addition to retroreflectors, balloons, and atmospheric discontinuities. To provide more real time tracking, the second generation GB-60B, using a dual-head ruby laser was developed. Clouds, retroreflectors, and terrain were successfully detected by the GB-60B. The maximum range from which energy was reflected from atmospheric clouds is 75.8 mi. A 2.25 in retroreflector was detected at 83 mi, and mountainous terrain was detected at 57 mi. Lidar can also be used to determine the density and distribution of particles. (Author summary modified)

21380 APTIC NO. 39838

Laskin, Sidney

THE MODIFIED CASCADE IMPACTOR. *Interdepartmental Committee on Air Pollution, Washington, D. C., Air Pollut., Proc U. S. Tech Conf., Washington, D. C., 1950, p. 656-671. 10 refs. (May 3-5, Louis C. McCabe, ed.)*

Many of the methods employed to characterize atmospheric contaminants in terms of particle size are limited in respect to practical field and laboratory problems, whereas others are inadequate in terms of sampling efficiency, selective size ranges, or complexity of the procedures required. The cascade impactor and the indirect procedure of analysis developed for this instrument fulfill in many respects the requirements for a standardizable instrument. Results of studies with a modified form of the instrument are described, including the methods developed in conjunction with these studies. Most particulates encountered in industrial atmospheres exhibit a wide range of size, generally presenting an asymmetrical or skewed probability of distribution of sizes. Normalization of the skewed distribution can be accomplished by a graphic method utilizing a logarithmic probability plot. The cascade impactor can be considered a multiple-jet sampler historically related to the konimeter and similar sampling devices. Operation, design criteria, and accurate stage calibrations are described. The procedure for determining the particle-size distribution of a uranium dioxide air sample collected with the modified impactor is discussed, as well as application of the modified impactor to characterization of dust and mist atmospheres of beryllium compounds.

21381 APTIC NO. 40203

Lasseur, Claude

SCHNEIDER-POELMAN PINK, YELLOW AND BLUE FILTER PAPERS FOR ATMOSPHERIC POLLUTION CONTROL EQUIPMENT. *(Papiers filtres Schneider-Poelman roses, jaunes, bleus pour appareil de measure de la contamination atmospherique). Text in French. Centre d Etudes Nucleaires de Saclay (France), Service de protection Contre les Radiations, Commissariat a L Engerie Atomique Note CEA-N-1218, 23p., Nov. 1969. 10 refs.*

Among the numerous methods for measuring atmospheric particles, one of the simplest and most known consists of collecting dust and aerosol on a filter and analyzing the radioactivity of the deposit. Amianthus-loaded paper filters named pink yellow, and blue are the most frequently used. Their mechanical and physical characteristics were presented and parameters necessary for the interpretation of the radioactivity measurement of the deposit were discussed. Aerosols and dusts were labeled with beta particles and the size distribution, amount, and the effect of humidity were measured.

21382 APTIC NO. 40616

Lee, Robert E., Jr., James S. Caldwell, and George B. Morgan

THE EVALUATION OF METHODS FOR MEASURING SUSPENDED PARTICULATES IN AIR. *Environmental Protection Agency, Research Triangle Park, N. C., National Environmental Research Center, 97p., 1972 (?). 19 refs.*

A detailed comparative study was conducted to define the relationships between and among commonly used methods for measuring suspended particulate matter. High-volume air samplers, British smokeshade measuring devices, membrane filter samplers, tape samplers, and cascade impactor samplers were operated for 24-hr sampling periods at 11 sites in Great Britain from January through June 1970. Data derived from gravimetric and optical analysis of the samples were used to develop regression equations and other relationships. Smoke shade measurements generally were lower than the corresponding hi-vol measurements when concentrations of suspended particulate matter were low. In contrast, black staining particulate matter can result in smoke shade values higher than corresponding values obtained gravimetrically. The soiling index correlated poorly with gravimetric measurements of suspended particulate matter. Size distribution and other parameters are discussed. (Author abstract modified)

21383 APTIC NO. 40636

Lopez-Roman, A. and George G. Guilbault

USE OF PIEZOELECTRIC CRYSTALS AS SENSITIVE AND SPECIFIC DETECTORS FOR SO2. *Anal. Letters, 5(4):225-235, 1972. 13 refs.*

The determination of sulfur dioxide-level is the most important and most frequently performed procedure in the analysis of the free atmosphere. The use of Carbowax 20 M as a sensitive and selective coating for the detection and determination of SO2 in the atmosphere, using a piezoelectric crystal as the gas chromatographic detector, is described. Some of the present research for the development of specific and sensitive piezoelectric crystal detectors is summarized. A general purpose piezoelectric crystal gas chromatograph is also described. A schematic drawing of the piezoelectric gas chromatograph and the electronic diagram of the mixer circuit oscillator are included. Two 9 MHz piezoelectric crystals were coated by spraying both sides of an electrode with a 5 g/l solution of Carbowax 20 M in chloroform. The response time was found to be about 5 sec and the recovery time of the detector, even for pure SO2, is about 1 min without heating or increasing the flow rate. However, pure nitric oxide and nitrogen dioxide seem to dissolve or attack the coating and, therefore, should be trapped before reaching the piezoelectric crystal detector. By the use of this device, from one to 100 ppm SO2 can be quickly and easily determined.

21384 APTIC NO. 40395

Lotze, Joerg

A NEWLY DEVELOPED MULTI-CHAMBER DUST MEASURING UNIT IN A DUST FILTER APPARATUS FOR DETERMINATION OF THE COLLECTION EFFICIENCY OF THE FILTER CLOTH. *(Ein neuentwickeltes Mehrkammerstaubmessgeraet in einer Staubfilterapparatur zur Bestimmung des Abscheidegrades von Geweben). Text in German. Neue Bergbautech., 2(3):188-192, March 1972. 12 refs. (Presented at the Technisch Wissenschaftlichen Kolloquiums der Kaliindustrie der DDR, 11th, March 26-27, 1971, Bad Salzungen, East Germany.)*

The multi-chamber dust measuring unit described is based on the gravimetric principle. Determination of the dust concentration is carried out by weighing the dust quantity collected on glass filter paper which absorbs very little moisture. The collection efficiency of this paper is 99.99%. The free filter area of 0.0452 sq m was selected in accordance with the collection properties of the glass filter paper. This yields an inner diameter of 240 mm. At a maximum gas throughput of 6 cu m/hr the inflow speed is 133 m/hr or 3.7 cm/sec. Since the mechanical stability of the glass fiber paper is not very great it is supported by a wire mesh. Below the wire mesh and above the filter a rubber sealing ring is installed. The outer diameter of the unit is 290 mm. A six-chamber filter is illustrated. Measurement errors are introduced through the inaccuracy of the scale and through dust deposition in the inlet hose. The switch from one chamber to the other takes just 3 sec. Short-term changes of the dust concentration can be very efficiently measured with the unit.

21385 APTIC NO. 40614

Ludwig, C. B., L. L. Acton, M. Griggs, G. D. Hall, W. Malkmus, and H. Reichle

REMOTE MEASUREMENT OF AIR POLLUTION BY NONDISPERSIVE OPTICAL CORRELATION. *Preprint,* *American Chemical Society, Washington, D. C.; American Inst. of Aeronautics and Astronautics, New York; Environmental Protection Agency, Washington, D. C.; Inst. of Electrical and Electronics Engineers, New York; Instrument Society of America, Pittsburgh, Pa.; National Aeronautics and Space Administration, Washington, D. C.; and National Oceanographic and Atmospheric Administration, Washington, D. C., 12p., 1971. 4 refs. (Presented at the Joint Conference on Sensing of Environmental Pollutants, Palo Alto, Calif., Nov. 8-10, 1971, Paper 71-1107.)*

A gas filter correlation instrument was flown on an aircraft in a program to remotely measure carbon monoxide in the atmosphere between the aircraft and the ground. The instrument, which operates in the 4.6 micron band of carbon monoxide, looks down and provides an output signal related to the amount of carbon monoxide in the atmosphere. This output, together with measurements of the surface temperature and the atmospheric temperature profile, allows the mean carbon monoxide concentration between the aircraft and the ground to be determined. The instrument and its theory are described, and typical results obtained over Southern California are discussed. Preliminary analysis of the data showed that the mean carbon monoxide concentration from the surface to an altitude of 3000 m varied from a low value of 0.04 ppm in the desert to about 0.35 in Los Angeles. (Author abstract)

21386 APTIC NO. 39789

Lundgren, D. A.

MASS DISTRIBUTION DATA FROM THE 1969 PASADENA SMOG EXPERIMENT. *J. Colloid Interface Sci., 39(1):205-210, April 1972. 5 refs.*

Approximately 50 particulate mass distribution samples were collected using Lundgren Impactors. Total particulate was also determined using filters; these were run during each impactor run in order to obtain an overall mass balance. The particulate mass concentration data from this study indicate an average of about 100 micrograms/cu m and a 95% range from about 50-200 micrograms/cu m. The impactor particle size distribution data indicate an average particle mass mean diameter of about 0.6 micron and a particle size distribution that is somewhat log normal with an average geometric standard deviation of about 3.5. The Minnesota Aerosol Analysis System (M.A.A.S.) indicated that a much larger fraction of the mass was associated with the several micron and larger size particles. A ratio of impactor-determined particulate mass to the M.A.A.S.-determined particulate volume fraction gave an average ratio of about 1.7. The main function of the impactor was to obtain time and size-fractioned particulate samples for the chemical analysis to be run by others.

21387 APTIC NO. 40051

Lux, H.

NETWORK INDEPENDENT AUTOMATIC SAMPLER FOR SHORT TERM AIR SAMPLING. *(Ein netzunabhaengiger, selbsttaetiger Probenwechsler fuer die kurzzeitige Luftprobenahme). Text in German. Z. Ges. Hyg. Ihre Grenzgebiete (Berlin), 18(4):244-246, April 1972. 2 refs.*

The automatic sampler for sulfur dioxide emission measurements by pararosaniline analysis comprises a rigid ring holding 24 micro-scrubbers. Each of the scrubbers ducts lead to a rigid disk. A toothed spring operated wheel with one boring rotates so that exactly after 60 min the boring faces one of the 24 ducts. When duct and boring face each other, a pump is switched on automatically by means of a contact. The pump is operated by a battery which must be charged every 3 days. Maintenance of the unit is simple. Its spring contact must be wound up every 2 to 3 days. After one rotation of the toothed wheel (i.e. after 24 hr) the set of scrubbers must be exchanged. One person can attend to four to six measuring stations. Practical experience has shown that this type of semi-continuous sampling yields results which are as valuable as those obtained by recording.

21388 APTIC NO. 39990

Maarse, H. and M. C. ten Noever de Brauw

CAT URINE ODOR AS AN AIR POLLUTANT. *(Kattepiesgeur als luchtverontreiniging). Text in Dutch. Chem. Weekblad, no. 68:11-13, Feb. 1972. 2 refs.*

A technique for the identification of a substance in water emanating typical cat urine odor is described. Cat odor caused by 4-mercapto-4-methylpentanone-2 which is formed in a reaction of hydrogen sulfide and mesityloxide in an aqueous medium. Very little mesityloxide may occur in solvents for insecticides, pigments, flavorings, printing ink, varnishes, and paints. Hydrogen sulfide in foods and small amounts of mesityloxide in plastic packagings or can coating caused a cat-like odor in several cases. A water sample from a river with a cat odor was analyzed by a gas chromatograph-mass spectrometer combination, to identify the odorous substance. The extraction was made with pentane, and an organoleptic test was performed after chromatography by means of a membrane separator. The points corresponding to the odor in the chromatograms for the extract and the synthetized 4-mercapto-4-methyl-pentanone-2 were identical. The mass spectra were obtained by means of a cyclic magnetic scanner. Both the spectra and the total ionization currents were fed into a computer, and a mass chromatogram was obtained which contained only those peaks of the total ionization current chromatogram which corresponded to a definite mass fragment. Since the retention times for the synthetized compound and the component found in the water sample were identical, the cat odor of the water was caused by 4-mercapto-4-methylpentanone-2.

21389 APTIC NO. 40352

May, Hans

POSSIBILITIES OF APPLICATION OF SPECTROSCOPIC TEMPERATURE AND CONCENTRATION MEASUREMENTS FOR THE STUDY OF REACTION KINETIC PROCESSES IN COMBUSTION ENGINES. *(Anwendungsmoeglichkeiten spektroskopischer Temperatur- und Konzentrationsmessungen zur Untersuchung reaktionskinetischer Vorgaenge in Verbrennungsmotoren). Text in German. Motortech. Z. (Stuttgart), 33(5):214-219, May 1972. 13 refs.*

Flame radiation as it occurs in the Otto engine depends on temperature, wavelength, pressure, gas composition, and geometry. In spectral measurement, i.e., at a given wavelength, these parameters, with the exception of the temperature, can be eliminated by alternating measurements of the emission and absorption of the gas. For this purpose the combustion chamber of the engine is irradiated with a lamp emitting a known intensity. First the gas radiation alone and then the illuminated gas radiation is measured at the same wavelength with the aid of a scattering or prism spectral apparatus. From the measured intensities the degree of absorption of the gas can be determined. With the aid of Planck's law the gas temperature can then be calculated. The concentration of the gas can also be measured with this method. Spectroscopic temperature and concentration measurements in the Otto engine reported in the literature are reviewed. Newhall and Starkman were the first to make spectroscopic concentration measurements in the cylinder of an Otto engine. The NO concentration was measured. The results can be confirmed by reaction kinetic calculations. Review of the few experiments that have been performed to date with this method indicates that a more detailed knowledge of the thermodynamic processes and reaction kinetics in the engine can be gained than with conventional methods.

21390 APTIC NO. 39877

McMurdie, Howard F.

APPLICATION OF THE ELECTRON MICROSCOPE TO AIR POLLUTION. *Interdepartmental Committee on Air Pollution, Washington, D. C., Air Pollut., Proc. U. S. Tech. Conf., Washington, D. C., 1950, p. 182-183. (May 3-5, Louis C. McCabe, ed.)*

The great advantage of the electron microscope lies in its very high resolution: objects down to about 50 A can be seen as distinct particles as opposed to a 5000 A limit with an ordinary light microscope. However, it is large, expensive, difficult to use, and requires a high vacuum which sharply limits the type of specimens that can be studied; thus, it is impossible to examine directly specimens with a high vapor pressure such as liquid aerosols and even some solids, such as ammonium chloride smoke. It is also impossible to determine the optical properties of crystals. Methods of mounting specimens, a process which is more complex than with the light microscope, are discussed, including suspension of particulate material in a liquid, use of thermal impingers, and shadowing.

21391 APTIC NO. 40406

Mikami, Y. and S. Takegoshi

APPLICATION OF COMPUTER TO GAS ANALYSIS. *(Gasu Bunseki ni okeru denshi keisanki no oyo). Text in Japanese. Bunseki kagaku, (Japan Analyst) (Tokyo), 19(8):1128-1132, Aug. 1970. 4 refs.*

A computerized automatic gas analyzer for automobile exhaust gas was constructed consisting mainly of an operation desk, an infrared analyzer, a computer for data collection and analysis, and a printer. The infrared analyzer had a detection range of 0-12% for carbon monoxide, 0-16% for carbon dioxide, 0-2000 ppm for lower hydrocarbons, and 0-10,000 ppm for higher hydrocarbons. The sensitivity was + or 1% at full-scale. The computer was a process control type in which the measuring instrument and the operation desk could be connected. Four equations were derived and used for the calculation of the corrected values of the three components in exhaust gas. Samples from seven modes of driving conditions can be calculated simultaneously and rapidly.

21392 APTIC NO. 40407

Mizuno, Kouichi and Hajime Shiio

X-RAY FLUORESCENT ANALYSIS OF ALKYL LEAD IN AIR WITH ACTIVE CARBON. *(Kasseitan ni yoru kukichu no arukiru namari no keiko ekusu sen bunseki). Text in Japanese. Bunseki Kagaku (Japan Analyst) (Tokyo), 21(2):271-273, Feb. 1972. 2 refs.*

Gasoline vapor containing alkyl lead can be absorbed on active carbon and the amount of lead content quantitatively analyzed by an X-ray fluorescent method. For briqueting carbon powder, stealic acid was a suitable binder, and the employed mixing ratio of carbon and binder was 3.2. The results were quite consistent with the calibration curve which was obtained by an impregnation method of a lead standard solution over the range from 0.1 mg to 0.5 mg Pb/3 g carbon.

21393 APTIC NO. 40637

Moiseyenko, Yu. I. and G. I. Shchelchkov

AUTOMATIC MULTIPOINT SYSTEM FOR MEASUREMENT OF MICROPHYSICAL CHARACTERISTICS OF FOG IN EXPERIMENTAL INSTALLATIONS. *(Avtomaticheskaya mnogotochechnaya sistema dlya izmereniya mikrofizicheskikh kharakteristik tumana v eksperimentalnykh ustanovkakh) Tr. Inst. Eksp. Meteorol., no. 1:17-26, 1969. 9 refs. Translated from Russian. Leo Kanner Assoc., Redwood City, Calif., 13p., July 28, 1971.*

NTIS, DDC: AD 728738

An automatic, 5-point system for measurement of the concentration and distribution spectrum of fog droplets has been developed and is in operation. An aerosol chamber system has been developed using photoelectric devices as sensors. An aerosol chamber and two heat and pressure chambers are equipped with these devices. The system allows up to six measurements of spectra to bee performed/min, with the indications recorded in digital form on paper tape. The electronic equipment in the system includes a special seven-channel integral amplitude analyzer, automatically connected to each sensor in the system. Since the system allows a large quantity of information to be produced concerning the concentration of fog particles and their distribution spectra by dimensions, it can be used to trace the nature of changes in fog perimeters at various points in the installation from the moment of fog formation up to its complete dissipation. Knowing the distribution spectra, the most important microstructural characteristics of a fog can be calculated. All measurements performed to date have been limited to the range of diameters of 2 to 30 micron. The greatest fog concentration measured by the system is 3000 particles/cu m. Extended tests and comparison with other devices have shown the reliability of the results produced using this system.

21394 APTIC NO. 39899

Moreau, L. and E. Vinet

DETERMINING THE ACTUAL ANTISEPTIC POWER OF SULFUROUS ACID IN MUSTS AND WINES BY MEANS OF THE IODINE INDEX. *(Sur la determination du pouvoir antiseptique reel de l acide sulfureux dans les mouts et les vins par la methode de l index iode). Text in French. Acad. Agric. Fr. C. R., vol. 23:570-577, 1937. 1 ref.*

As the antiseptic and non-antiseptic, free forms of sulfur dioxide present in musts (new wines) and treated wines should be distinguished, Rippert s method was replaced by the iodine index method permitting the determination of the actual antiseptic power. The method is based on the fact that non-hydrated SO2, dissolved in liquid, and atmospheric SO2 are in equilibrium in liquids enclosed by a limited atmosphere. This equilibrium is influenced by the temperature and the acidity of the liquid. Thus, the concentration of SO2 is in proportion to the actual antiseptic power of the sulfurous acid present in the liquid in the form of SO2 and H2SO3. The determination is made by means of blue iodine index introduced with starch paste in the atmosphere. The decoloration time is inversely proportional to the concentration of SO2 and H2S03; the latter represents the really antiseptic sulfurous acid of the liquid. The device and an example of the determination are described. An Erlenmeyer flask was used with a liquid temperature of 20 C. The mean deviation for 20 samples was 2.7%. A control with saccharomyces cultures showed good agreement of the results.

21395 APTIC NO. 40741

Munger, Hamnett P.

THE SPECTRUM OF PARTICLE SIZE AND ITS RELATION TO AIR POLLUTION. *Interdepartmental Committee on Air Pollution, Washington, D. C., Air Pollut., Proc. U. S. Tech. Conf., Washington, D. C., 1950, p. 159-166. 14 refs. (May 3-5, Louis C. McCabe, ed.)*

Natural and industrial sources of airborne particlulates in different size ranges, and techniques for sampling effluent stack gases and outdoor air are briefly reviewed. A new method for sampling air at low altitude is described, consisting of using kite-balloons as skyhooks for raising a sampling tube to the desired altitude. In sampling gases in the air, the sample is drawn down the tube continuously with a vacuum pump and sampled at ground level, thus continuously following the concentration changes of the gaseous contaminant at altitudes 500 ft or higher, or to determine its variation at different altitudes. Samples may be take vertically or horizontally around a point source, meteorologic data can be collected, and sampling equipment can be raised to the desired altitude to collect particulates. Gas cleaning equipment is compared with applicable particle size ranges, and examples are given of profitable by-product recovery from the separated contaminants.

21396 APTIC NO. 39983

Naylor, A. G. and B. H. Kaye

SPATIAL FILTERING FOR DETECTION OF PARTICULAR SHAPE. *J. Colloid Interface Sci., 39(1):103-108, April 1972. 6 refs.*

Large-scale monitoring of urban air and industrial environments is resulting in the generation of many microscope slides and filters containing small particles to be evaluated both for size and shape. There is a growing need for an automated system which can scan many microscope slides and isolate particles of particular shape and/or size for intensive evaluation by the analyst. Optical spatial filtering, in use presently to detect alpha numeric characters, is suggested as a useful tool for the aerosol scientist. As the system is presently used, the diffraction pattern from a page of text in subjected to holographic filtering using an optical filter. Wherever the particular word being searched appears on the page, a bright spot appears in the appropriate spot of the output image plane. Words similar in overall shape to the specified word also give a response but not as large a one. Thus in the case of the search for circular particles, the technique would locate all circular profiles and a few large agglomerates with overall circular structure which could later be rejected by the analyst. The technique is demonstrated in the case of a search for the circular organic tinting particles among smaller titanium dioxide particles in a paint film.

21397 APTIC NO. 40027

Nehls, R.

AUTOMATIC MEASUREMENT, COUNTING AND CHARACTERIZATION OF PARTICLES WITH THE MILLIPORE PARTICLE-MEASURING-COMPUTER PI MC. *(Automatisches Messen, Zaehlen und Charakterisieren von Partikeln mit dem Millipore Partikel-Mess-Computer Pi MC). Text in German. Chem. Rundschau (Solothurn), 25(17):507, April 26, 1972.*

The PiMC computer studies particles according to following parameters: number of particles, total surface of the particles, total projected length of the particles, number of particles larger than a certain value, average surface of a particle, average projected length, longest dimension of a particle, projected length of a particle, surface of a particle with holes, surface of a particle without holes, and Feret s diameter of a particle. The pictures of the microscope are analyzed with the aid of a television camera and by computer techniques. The total time for preparation, measurement, and evaluation of the data is less than 10 min.

21398 APTIC NO. 39997

Neuberger, Edmond Donald and Thomas Joseph Junker

SAMPLING SYSTEM FOR STACK GAS. *(Calgon Corp., Pittsburgh, Pa.) U. S. Pat. 3,641,821. 4p., Feb. 15, 1972. 4 refs. (Appl. April 7, 1970, 9 claims).*

Steam eductors were used to remove continuous or chronologically ordered samples of stack gas for analysis of one or more components. The steam eductor utilizes steam as both a driving force and a sample scrubber. Soluble and insoluble components are present in the dissolved or suspended form in the condensate. The system is particularly useful in continuous sampling. Additives may be used to enhance the selectivity of the process.

21399 APTIC NO. 40106

OHara, Francis J., W. M. Keely and Harold W. Fleming

SPECTROPHOTOMETRIC DETERMINATION OF CARBONYL SULFIDE IN PETROLEUM REFINERY GAS. *Anal. Chem., 28(4):466-470, April 1956. 8 refs.*

A spectrophotometric method for the determination of carbonyl sulfide in petroleum refinery gases is described, which is based on the reaction of carbonyl sulfide with piperidine in aqueous solution to form piperidine oxythiocarbamate. This analysis is performed without any interference from hydrogen, oxygen, nitrogen, carbon monoxide, methane, ethane, acetylene, ethylene, propane, and propylene. Techniques are presented for either removing or correcting interferences that result from the presence of hydrogen sulfide, methyl mercaptan, carbon dioxide, sulfur dioxide, carbon disulfide, thiophene, and conjugated diolefins. An accuracy of 1 ppm of carbonyl sulfide can be obtained for synthetic blends within the range of 1 to 50 ppm. Results on refinery samples are reliable to within 10% of the amount present in the range from 1-50 ppm of carbonyl sulfide. (Author abstract modified)

21400 APTIC NO. 40409

Okita, Toshi..azu

MEASUREMENT OF HYDROGEN FLUORIDE USING FILTER METHOD AND SEPARATE DETERMINATION OF GASEOUS AND PARTICULATE FLUORIDES. *(Filta ho ni yoru fukkasuiso sokuteiho oyobi gasujo oyobi ryushijo fukkabutsu no bunri sokuteiho). Text in Japanese. Kankyo Hoken Reporto (Environ. Health Rept.) no. 8:19-22, Jan. 1972.*

For efficient collecting and separating of gaseous and particulate hydrogen fluoride, the method using alkaline filters prepared with sodium carbonate and potassium carbonate was described. Filters prepared with 1% alkaline solution have little effect on the absorbance of the alizarin complexon method and give a good collecting yield. Hydrogen fluoride is produced using various dilutions of hydrofluoric acid under 0-5 C and 20-30 C, and also using permeation tube of HF under 3-5 C and 20-30 C. Concentrations of HF obtained by both ways is 0.05-1.0 ppm. As a determination of particulate fluoride compounds, the milipore filter AA is the best for the efficient collecting and filtering nearly 100% of hydrogen fluoride. A milipore AA filter which is 50 mm in diameter and an alkaline treated filter are connected setting the flow volume at 20-30 l/min. Particulate fluoride compounds and gaseous hydrogen fluoride are measurable by this method at the sensitivity of 1 microgram/cu m and 1 ppb/2 hr. Either the Alphson method or fluoride electrode method are applicable for analysis. The temperature and humidity are independent of the collecting yield. The concentrations of fluoride compounds in the atmosphere were determined in the area of an aluminium refinery in Niigata City using alkaline filter method.

21401 APTIC NO. 40053

Okuno, Toshihide, Masahiko Tsuji, and Nobuhiro Takata

ON THE ANALYTICAL METHOD FOR ODOR SUBSTANCES. *(Akushu busshitsu no bunseki-ho ni tsuite). Text in Japanese. Hyogo-Ken Kogai Kenkyusho Kenkyu Hokoku (Rept. Public Nuisance Res. Inst. Hyogo Prefect., no. 3:8-13, 1972. 5 refs.*

Ketones and aldehydes in the mixture gas were identified using both a gas chromatograph (GC) and a mass spectrometer (MS). Fragmentation of ketones and aldehydes was also considered. Moreover, a column suitable for the separation of aliphatic amines was examined. Sample gas was generated by heating a solid powder of nitro super-phosphate (a fertilizer) with organic nitrogen at 100 deg. Air pollutants generated from this solid powder were separated into 12 substances by GC and 11 of them were confirmed by MS analysis. Alkyl aldehydes and ketones reached to 60% of the whole, and mercaptan, furan, and dimethyl disulfide were detected as odor components. Amine compounds were not detected in this experiment. Concerning fragmentation of each molecule of ketones and aldehydes in the GC-MS analysis, a standard peak of 43 of alkyl ketone should be noticed. In the GC analysis of 12 aliphatic amines using 20% triacetin as the liquid phase, good results were obtained in the separation of lower aliphatic amines.

21402 APTIC NO. 40805

Olin, J. G.

AIRBORNE PARTICLE MONITORING APPLICATIONS OF THE PARTICLE MASS MONITOR SYSTEM. *Preprint, American Chemical Society, Washington, D. C.; American Inst. of Aeronautics and Astronautics, New York; Environmental Protection Agency, Washington, D. C.; Inst. of Electrical and Electronics Engineers, New*

York; Instrument Society of America, New York; National Aeronautics and Space Administration, Washington, D. C.; and National Oceanic and Atmospheric Administration, Wasington, D. C., 7p., 1971. 10 refs. (Presented at the Joint Conference on Sensing of Environmental Pollutants, Palo Alto, Calif., Nov. 8-10, 1971, Paper AIAA 71-1100.)

The particle mass monitor system combines a piezoelectric particle microbalance with an electrostatic-precipitator collector to measure, instantaneously, the total mass concentration of air-borne particles in the range of 1-200,000 micrograms/cu m over the particle size range of 0.01-20 micron. Because of its fast response and wide dynamic and size ranges, the instruments has many particle monitoring applications. The applications are extended even further with four standard accessories: sampling system, dilution system, respirable range separator, and impactors for particle size distribution measurements. Each application requires special attention to the sampling and aerosol conditioning systems. Major applications include ambient air-quality monitoring, laboratory aerosol research, particle collector efficiency tests, process control, mobile monitoring, and automotive particulate emissions. Instrument design, operation, and efficiency are reviewed. (Author abstract modified)

21403

APTIC NO. 40494

Osaki, Hirokazu and Masana Ogata

THE ANALYSIS OF ATMOSPHERIC SULFUR DIOXIDE CONCENTRATION PER HOUR BY ELECTRONIC COMPUTER. (PART 3). AIR POLLUTION AND PUBLIC NUISANCE. *Nippon Koshu Eisei Zasshi (Japan. J. Public Health), 16(4):455-463, April 1969. 4 refs.*

From the hourly sulfur dioxide concentration data measured by an automatic analytical recorder, a program was designed for the calculation of the maximum, the mean, and the total values of the daily SO2 concentration in the atmosphere, as well as the mean value for one month, the mean hourly SO2 concentration over one month, the wind direction frequency, the average SO2 concentration according to the wind direction, and the date and hour when the density exceeded 0.2 or 0.1 ppm. The SO2 concentration was measured according to the wind velocity for a given wind direction, using a small type electronic computer having a memory capacity of 2000 words. Flow charts for the specific calculations were shown. The calculation of SO2 concentration in air according to various factors can be accomplished readily and correctly with the use of an electronic computer. (Author conclusions modified)

21404

APTIC NO. 40622

Ott, Wayne, Robert

AN URBAN AIR SURVEY TECHNIQUE FOR MEASURING THE SPATIAL VARIATION OF CARBON MONOXIDE CONCENTRATIONS IN CITIES. *Stanford Univ., Calif., Dept. of Civil Engineering, Thesis (Ph.D.), Oct. 1971, 163p. 31 refs.*

An air quality survey technique was used to determine how representative an urban air monitoring station is of concentrations throughout the city. Samples were collected over 6 months in San Jose, California and compared with values recorded simultaneously at the urban air monitoring station. Concentrations three times as much as those at the air monitoring station were found on days of heavy traffic. Samples from random locations were consistently lower than the station. There is evidence of an urban background concentration that is lower than the concentrations recorded at the station and that relocation of the station by as little as 200 ft could remove it from the influence of traffic and reduce the long-term average carbon monoxide values by nearly half. The high concentrations observed near streets decreases quite rapidly with increasing distance from those streets. (Author abstract modified)

21405

APTIC NO. 39836

Parker, A. and S. H. Richards

INSTRUMENTS USED FOR THE MEASUREMENT OF ATMOSPHERIC POLLUTION IN GREAT BRITAIN. *Interdepartmental Committee on Air Pollution, Washington, D. C., Air Pollution., Proc. U. S Tech. Conf., Washington D. C., 1950, p. 531-546. 9 refs. (May 3-5, Louis C. McCabe, ed.)*

The earliest form of apparatus for the measurement of pollution was the deposite gage. At present 300 deposit gages are in regular use in Great Britain. A convenient method for determining the distribution of dry deposited matter over a district is to expose petri dishes for a period of 24 or 48 hr in suitable weather conditions. Petri dishes are most effective for sampling ash and other particles which fall rapidly. For the measurements of suspended solid impurities in the air, two methods are commonly used, the Owens automatic air filter for obtaining hourly readings of the concentration of smoke in the air, and the more recently developed smoke filter apparatus for daily observations. In both methods, the solid particles from the air are collected on a filter paper and form a circular stain, the density of which is estimated by comparison either with a calibrated scale of stains or by a photometric method. In 1932, a new method for obtaining comparable records of the extent of atmospheric pollution by sulfur dioxide was devised. This method, based on the facility with which SO2 in the air is absorbed on a prepared lead peroxide surface to form lead sulfate, found wide application. Used to a lesser extent for determining SO2 concentration is the volumetric method, in which a measured volume of air is bubbled through a dilute solution of hydrogen peroxide; the sulfuric acid thus formed is estimated by neutralization of the acidulated hydrogen peroxide with alkali.

21406

APTIC NO. 40338

Perley, G. A. and B. F. T. Langsdorf

PROBLEMS IN THE RECORDING OF SO2 IN POLLUTED ATMOSPHERES. *Interdepartmental Committee on Air Pollution, Washington, D. C., Air Pollut., Proc. U. S. Tech. Conf., Washington, D. C., 1950, p. 556-566. 2 refs. (May 3-5, Louis C. McCabe, ed.)*

The design of an autometer for the measurement of sulfur dioxide in the atmosphere was described. A controlled quantity of absorbing solution is fed countercurrent to a controlled volume of air sample. The absorbing solution delivered at a rate of 3.3 ml/min consists of 0.00005 N sulfuric acid and 0.002-0.004 M hydrogen peroxide. The air sample is untroduced at a rate of about 8.5 l/min into the absorber. The absorption rate of SO2 in the dilute sulfuric acid solution is extremely high. The rate of the oxidation of the resultant sulfurous acid by the hydrogen peroxide is the slower of the two reactions. A solution feed conductivity-measuring cell located at the intake of the absorber serves to indicate the constancy of composition of the absorbing solution. A measuring cell located at the exit of the absorber serves to measure continuously the change in conductivity caused by the absorption of SO2 and its resultant oxidation. A third conductivity cell is located in a glass receptacle in the exit line from the measuring cell, and a sample is collected over a period of 30 min. The periodic conductivity is measured in an effort to obtain an average over this arbitrary time interval. The accuracy of these measurements depends upon the ability to maintain a constant feed rate of the absorbing solution of a fixed initial conductivity, a constant air sample rate, a constant solution temperature in all three conductivity cell, and on the reproducible oxidation of the dissolved SO2.

21407

APTIC NO. 39839

Pigford, R. L.

AUTOMATIC DETERMINATION OF SIZE DISTRIBUTIONS OF HETEROGENEOUS LIQUID SPRAYS. *Interdepartmental Committee on Air Pollution, Washington, D. C., Air Pollut., Proc. U. S. Tech. Conf., Washington,* *D. C., 1950, p. 672-678. 6 refs. (May 3-5, Louis C. McCabe, ed.)*

The sizes of the sprays and drops in wet dust collectors and spray-type gas absorbers or in the use of liquid insecticides on plants influence the exposed surface area of the spray and the trajectories of the particles after the spray is released into a gas stream. A common procedure followed in making determinations of drop sizes of particles larger than a few microns in diameter has involved collection of a few thousand droplets on a greased glass slide or under a layer of oil if water is being sprayed, or on microscope slides coated with soot or magnesium oxide smoke if the droplets are oil. After collection the spray sample is often photographed to record the sizes permanently before evaporation causes some of the droplets to disappear. A method of size measurement is described which starts with such a magnified photograph of droplets and yields statistical data on the size distribution function and the total number of droplets on the photograph. The method is an optical one in which a small light beam passes through the photograph into a photoelectric cell which counts the number of times the beam is obscured by drop images as the photograph is moved through the beam.

21408 APTIC NO. 39915

Pillay, K. K. S. and C. C. Thomas, Jr.

DETERMINATION OF THE TRACE ELEMENT LEVELS IN ATMSOPHERIC POLLUTANTS BY NEUTRON ACTIVATION ANALYSIS. *Missouri Univ., Columbia, Proc. Missouri Univ. Fourth Annu. Conf. Trace Substances Environ. Health, Columbia, Mo., 1970, p. 420-432. 16 refs. (June 23-25.)*

An investigation of the potentials of neutron activation analysis for the routine analysis of trace elements present in atmospheric pollutants is discussed. Various techniques including sequential air sampling, multiple neutron irradiation, high resolution gamma ray spectrometry, chemical isolation, high flux neutron irradiation, and x-ray spectrometry were employed to determine the levels of lead, aluminum, vanadium, iodine, chlorine, manganese, copper, bromine, sodium, lanthanum, molybdenum, gold, chromium, iron, nickel, selenium, zinc, silver, and cobalt in atmospheric pollutants. The results of the analysis of nearly 200 samples collected from the Buffalo, N. Y. area during 1968-69 are reported. (Author abstract)

21409 APTIC NO. 40699

Pinigina, I. A.

USE OF 2,4-DINITROPHENYLHYDRAZINE FOR DETERMINING CARBONYL COMPOUND IN THE AIR. *(Primeneniye 2,4-dinitrofenilgidrazina dlya opredeleniya karbonil nykh soyedineniy v vozdukhe). Text in Russian. Gigiena i Sanit., 37(4):78-81, 1972. 6 refs.*

Problems of the use of 2,4-dinitrophenylhydrazine for the determination of low carbonyl compounds in the air are outlined. The 2,4-dinitrophenylhydrazine to be used for such purposes should be of high purity. The purification was made by distillation of the 2,4-dinitrophenylhydrazine from purified ethylacetate, followed by twofold recrystallization. As the total sample volume to be analyzed by chromatography should be concentrated to 0.05-0.1 ml, the 2,4-dinitrophenylhydrazine was dissolved in an acid medium, from which the hydrazones were eliminated by means of an organic solvent such as isooctane, benzene, chrloroform, or cyclohexane. A method for the selective determination of Cl-C4 aldehydes by means of purified 2,4-dinitrophenylhydrazine was elaborated. The optium conditions of the determination were: threefold excess of 2,4 dinitrophenylhydrazine, compared to the acetaldehyde; a reaction time of 3 hours; 50%-solution of dimethylformamide in ethanol as stationary phase; hexane as mobile phase; and an anaylsis time of 3-4 hours. The quantitative determination was made by means of 20 basic solution added to the eluate. The absorption maxima were 440-450 nm. The sampling for Cl-C4 aldehydes was made by a series of three absorbers containing 0.001 M-solution of 2,4- dinitrophenylhydrazine in a 2n-hydrochloric acid solution, at an aspiration rate of 0.5 l/min. The sensitivity was determined to be 0.5 micrograms. Ketones interfered with the determination.

21410 APTIC NO. 39976

Pomazova, E. N. and E. Ya. Heidorf

EXTRACTION-PHOTOMETRIC METHOD OF DETERMINING TRIETHYLAMINE IN THE AIR. *(Ekstraktsionno-fotometricheskiy metod opredeleniya trietilamina v vozdukhe). Text in Russian. Gigiena i Sanit., 37(2):56-58, 1972. 3 refs.*

A method of determining triethylamine in the air, based on the reaction of organic bases with acid colorants, is described. The colored salts obtained are extracted by means of chloroform. The air sampling was made at a rate of 0.5 l/min by means of two series absorbers containing 0.01-hydrochloric acid. The sample thus obtained was transferred into a colorimetric tube to which 0.01 n-hydrochloric acid and 0.1% bromphenol blue were added. The pH value was adjusted to 4.0 by means of an acetate buffer. Maximum reproducibility was obtained when cooling was applied. The absorption maximum was 420 nanom, and Lambert-Beer's law was valid. The sensitivity of the method for spectrophotometric and visual determination was 0.5 micrograms and 2 micrograms, respectively. The control with o-nitrophenol showed good accordance of both methods. Ammonia, methylamine, ethylamine, dimethylamine, and diethylamine in amounts up to 1-2 mg had no disturbing effect on the triethylamine determination.

21411 APTIC NO. 40311

Popov, I. N., E. F. Cherkasov, and O. L. Trakhtman

DETERMINATION OF THRESHOLD OF SULFUR DIOXIDE CONCENTRATION BY ODOR. *(Opredeleniye porogovoy kontsentratsii sernistogo gaza po zapakhu). Text in Russian. Gigiena i Sanit., no. 5:16-20, 1952. 2 refs.*

Static and dynamic methods for determining sulfur dioxide concentration by odor are briefly discussed, and apparatus for determining the absolute odor threshold for SO2 perception by both methods are described. Results of an analysis of SO2 threshold concentrations by the dynamic method showed that concentrations/lower than 4 mg/cu m are not perceived by odor. Concentrations of 4-6.5 mg/cu m were in most cases just barely perceived, those of 6-8.5 mg/cu m were usually perceived as a distinct odor, and concentrations higher than 8.5 mg/cu m were perceived as sharp odor. These results differ from data reported in the literature. Maximum permitted one-time and average daily concentrations (0.75 and 0.25 mg/cu m, respectively) are thus far below the threshold of SO2 perceptibility, and perception of SO2 in the air by odor indicates that its concentration greatly exceeds the maximum permitted concentration.

21412 APTIC NO. 40764

Radczewski, O. E.

INVESTIGATION OF FINE PARTICLES IN MINERALOGICAL SEGREGATIONS BY ELECTRON MICROSCOPY AND DIFFRACTION. *(Moeglichkeiten und Ergebnisse der Bestimmung feinster mineralischer Ausscheidungen mit Elektronenmikroskopie und -beugung). Text in German. Optik (Stuttgart), 31(2):126-140, May 1970. 12 refs. (Presented at the German Society for Electron Microscopy and the Austrian Association for Ultrastructural Research, Vienna, Austria, Sept. 1969.)*

The exact determination of crystalline particles is performed in the electron microscope by single-crystal diffraction from which lattice distances and lattice constants can be determined and which allows morphologically identical or similar forms (clay minerals) to be distinguished. Examinations for flaky particles perpendicular to the sheet plane (kaolinite) or opaque isometric objects (zinc oxide) should be made with ultra-thin sections that allow the existence of a cubic modification of hexagonal ZnO with a lattice constant of ao equals 5.587 A to be proved. The method is used successfully for identification of air pollutants down to about 0.2 micron. Determination by the Fink index, the ASTM index, and by computing and measuring angles between specific lattice directions is described, using the examples of rutile and KALF4. The technique also allows identification of epitaxially grown corrosion-inhibiting layers on iron and their positive distinction (e.g., from muscovite) even when lattice distances in the directions of transradiation are almost identical.

21413 APTIC NO. 40632

Remezentsev, B. F., Ye. Z. Pevzner, Yu. Ya. Gokhman, and V. Ye. Serenkov

GAS SAMPLING DEVICES FOR OXYGEN MEASUREMENT INSTRUMENTS USED IN BOILERS OPERATING ON SULFUROUS HEAVY OIL. *(Gazootbornye ustroystva kislorodomerov v kotlakh, szhigayushchikh sernistyy mazut). Text in Russian. Elektr. St. (Moscow), no. 3:32-35, March 1969. 5 refs.*

Gas sampling devices for oxygen measurement instruments in sulfurous heavy oil-fueled boilers as well as the latest developments in this area are described. Point sampling from the center of each gas duct is sufficient for the oxygen control in boilers operated at low excess air coefficients. Samplers should be equipped with a separator tube for the separation of course particles. Such tubes, suitable for the separation of particles larger than 81 micron at a minimum flow rate of 10 cm/sec, cause an additional delay of 3-4 sec. A mechanical filter, made of glass fiber, for example, should be incorporated in the system outside the gas duct, and be maintained at a temperature between the dew point and 250 C. Both the sulfur dioxide and sulfur trioxide are removed, and the condensation of the vapors in the detector chamber and the inlet pipes is prevented by an appropriate cooler. Water ejectors and bubblers fail to give satisfactory results. A vibratory compressor following the cooler provides condensate discharge in time, and increases the reliability of the sampler.

21414 APTIC NO. 40812

Schwiesow, R. L.

RAMAN SCATTERING STUDIES OF POLLUTANT SYSTEMS. *Preprint, American Chemical Society, Washington, D. C.; American Inst. of Aeronautics and Astronautics, New York; Environmental Protection Agency, Washington, D. C., Inst of Electrical and Electronics Engineers, New York; Instrument Society of America, New York. National Aeronautics and Space Administration, Wasington, D. C., 4p., 1971. 7 refs. (Presented at the Joint Conference on Sensing of Environmental Pollutants, Palo Alto, Calif., Nov. 8-10, 1971, Paper AIAA 71-1086.)*

Remote sensing of environmental constituents by Raman lidar is an attractive scheme for monitoring molecular environmental pollutants. Results and techniques for laboratory measurements of Raman scattering cross sections and depolarization ratios of atmospheric gases as a function of incident photon energy are examined. The cross section of water, relative to nitrogen as a reference, changed by a factor of 2 as the incident photon energy was changed by 5%. Results for sulfur dioxide, nitric oxide and other gases were less dramatic. Significant changes in cross section occurred with small changes in pump frequency. Preliminary spectral features of scattering from polluted airwater interfaces are also considered. (Author abstract modified)

21415 APTIC NO. 40410

Shalamyanskiy, A. M.

FEATURES OF GLOBAL OZONE MEASUREMENT PROCEDURES UTILIZING WIDE BAND TRANSMISSION INSTRUMENTS. *(Osobennosti izmereniya obshchego soderzhaniya ozona priborami s shirokimi polosami propuskaniya). Text in Russian. Tr. Gl. Geofiz. Observ. (Moscow), no. 255:148-159, 1970. 11 refs.*

Features of total ozone measurement procedures utilizing wide-band filter instruments are described with special regard to the sensitivity to ozone, dynamic range and the Buger's method applied to ozone measurement. The instruments considered contain two filters, a photomultiplier, and an amplifier. The spectral sensitivity of such instruments can be defined as the filter transmission band. Calculations of the ultraviolet radiation intensity revealed rapidly decreasing radiation with decreased wavelength. The sensitivity of the instrument for ozone rose rapidly with decreased wavelengths and decreased only slightly with filter band extension for 10-20 nanom filter bands, while considerable decrease with transmission band extension in filters with bands above 10-20 nanom was observed. Relative variations in the ozone content with 10% decrease in ultraviolet radiation were determined for different filters. Minimum error was determined for short-wave filters, and the error was nearly constant for filters up to 200 nanom. The ozone measuring instruments have very wide dynamic ranges (maximum-minimum signal ratio) within the whole spectral section, especially in the case of short-wave filters. Since the sensitivity for ozone with linear amplification is poor, logarithmic amplification is best. Filters with maximum transmission below 315 nanom are most suitable for ozone measurements. Simple filter-type instruments with relatively wide transmission bands should be applied in measuring networks, since filters with adequate parameters are comparable in their sensitivity and accuracy to monochromatic instruments.

21416 APTIC NO. 40200

Sheperd, Martin

METHOD FOR IDENTIFYING AND ESTIMATING GASES AND VAPORS IN AIR POLLUTION. *Interdepartmental Committee on Air Pollution, Washington, D. C., Air Pollut. Proc. U. S. Tech. Conf., Washington, D. C., 1950. p. 228-230. 1 ref. (May 3-5, Louis C. McCabe, ed.)*

A sampling and analytical procedure is described employing a concentrating sampler, a modified form of the conventional distilling tube with filter, to collect trace amounts of gaseous and vaporous pollutants from 100-200 air, at a sampling rate of 1 l/min. Distillation techniques are detailed. The mass spectrometer is used to examine the distillates, since it can identify and estimate more of the molecular species likely to be present than any other single instrument. The infrared spectrometer may be of assistance in a second examination of any complex sample. Results with sulfur gases by this method check satisfactorily with chemical methods, sometimes detecting smaller amounts. The method should yield a more complete assay with less time and effort than other methods. Where identification is not well followed by estimation, it will at least indicate the special chemical or physical procedures to be used to conclude the examination.

21417 APTIC NO. 40331

Shilin, B. V. and M. Ye. Berlyand

SEVERAL EXAMPLES OF THE USE OF THE REMOTE SENSING OF GASES AND VAPORS. *Michigan Univ., Center For Remote Sensing Information and Analysis and Environmental Protection Agency, Washington, D. C., Water Quality Office, Proc. Symp. Remote Sensing Environ., 7th, Ann Arbor, Mich., 1971. vol. 3:1733-1738. 11 refs. (May 17-21.)*

In the Soviet Union the first attempt at remote sensing of vapors was conducted in 1970. The volcanic activities on Kamchatka and the associated emission of various gases were investigated. The measurement equipment consisted of a gas analyzer based on an electrochemical principle. Special equipment developed for rapid sampling consisted of several glass ampules which had volumes of approximately 1.5 l and which were fitted with valves, a vacuum pump, and teflon tubing. Reliable results could only be obtained from the first reading. During investigations of the fumaroles and the thermally active Calderas of Uzon, sulfur dioxide concentrations at various altitudes and velocities, and under various meteorologic conditons were measured. It was shown possible to study volcanic eruptions by aero-geochemical methods. The method permits determination not oaly of the composition of the erupted gas but also of the amount of gas expelled into the atmosphere per unit time. The spatial variation of the gas concentration near the source was mathematically analyzed.

21418 APTIC NO. 40519

Shirasawa, Tadao

PROBLEMS REGARDING THE ANALYSES AND METHODS OF AIR POLLUTION. *(Taiki osen ni kansuru bunseki sokuteiho no mondaiten). Text in Japanese. Kagaku Kojo (Chem. Factory), 16(3):13-17, March 1972.*

In order to take effective measures for the prevention of air pollution, one must first obtain accurate, qualitative and quantitative data of its actual condition. Some of the problems regarding the analyses and measuring devices of air pollution are discussed. The topics included are the types of measuring equipment including instruments for the continuous recording of the data, the measuring points in ambient air vertically and horizontally in relation to the source of air pollution, the frequency as well as duration of measuring time, and the procedures regarding the analyses of the 28 chemical compounds, designated as the pollutants by the Air Control Act.

21419 APTIC NO. 39808

Smith, W. S., R. T. Shigehara, and W. F. Todd

A METHOD OF INTERPRETING STACK SAMPLING DATA. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 23p., 1970. 7 refs. (Presented at the Air Pollution Control Association, Annual Meeting, 63rd, St. Louis, Mo., June 14-19, 1970, Paper 70-34.)*

As more and more emission standards are enacted, air pollution control agencies will be faced with the evaluation of stack test data. A mass emission rate or concentration will be either reasonable, high, or low, and the evaluator is faced with the task of determining which is the case. A method using specific calculations to determine whether proper sampling conditions (isokinetic for particulates) were actually attained is examined. By calculating the mass emission rate by the ratio of areas and the concentration basis, the ratio of the results yields the apparent average proportion of isokinetic conditions. The equation variables include average sample concentrations, stack gas velocity, sampling rate, and gas volume. Data evaluation and sampling methods and guidelines to approximate the true concentration are presented.

21420 APTIC NO. 40277

Snyder, Arthur D., Edward C. Eimutis, Michael G. Konicek, Leo P. Parts, and Paul L. Sherman

INSTRUMENTATION FOR THE DETERMINATION OF NITROGEN OXIDES CONTENT OF STATIONARY SOURCE EMISSIONS. (VOLUME II). *Monsanto Research Corp., Dayton, Ohio, Dayton Lab., National Environmental Research Center Contract EHSD 71-30, MRC-DA317, Rept. APTD 0942, 240p., Jan. 1972.*

NTIS: PB 209190

The performance of seven commercial monitors for applicability to the continuous determination of nitrogen oxides from stationary sources was evaluated. Based on the present and projected requirements in stationary source emissions monitoring, the ranking, utility factors, and ranges of performance were first established for each of 15 performance parameters. These desired instrument parameters formed a matrix against which the quantified performance values as measured in the laboratory and on an operating power plant flue gas composition could be compared. The comparison of the evaluation data on each performance parameter with the desired performance matrix resulted in an estimate of overall performance of the tested nitrogen oxide monitors. This overall performance is calculated in the form of an index of performance for each instrument. The evaluation results indicate that the commercial monitors exhibited performance indices ranging from 0.57 to 0.78 versus a potential value of 0.99 for an instrument meeting all of the desired performance values. There is a definite need for further research and development on improved continuous nitrogen oxide monitors to satisfy both the present needs, the projected requirements when nitrogen oxide abatement processes are installed in new and existing stationary sources. The monitors included non-dispersive infrared instruments, an ultraviolet spectrometer, electrochemical monitors, and a radioactive tracing method.

21421 APTIC NO. 40301

Soininen, Antti, Anna-Liisa Pehu-Lehtonen, and Elli Auterinen

ATMOSPHERIC OZONE IN HELSINKI AND ITS EFFECTS ON RUBBER. *Tek. Kem. Aikak., vol 19:659-669, 1962. 15 refs.*

A method for determining atmospheric ozone was developed and applied to 250 to 500-liter air samples collected at 22 m above sea level. To obtain large quantities of gas, the outside air passes through three absorption columns to a gasometer with suction pump installed in the laboratory, to which a manometer is connected for differential pressure readings. Uniform calculations are then applied. An acid absorption solution of 0.1 N boric acid is employed to achieve a rapid reaction, with 20% potassium iodide dissolved in the solution. The pH varies between 5.8 plus or minus 0.5. Before absorption, 3 ml 0.01 N sodium thiosulfate are added to every 100 ml of absorption solution and the unused thiosulfate is titrated with a 0.005 N iodine solution. The titration is comparatively sharp when 0.3% starch solution is used as an indicator. Ozone-equivalent data for Helsinki, obtained during a 1-year 5period using is method, are presented. Average values varied seasonally from less than 20 pphm to almost 30 pphm. These values are markedly higher than those reported from middle and southern Europe. The effect of ozone on unstressed rubber is very slight; however on stressed rubber, ozone reacts rapidly, causing typilcal cracks perpendicular to the direction of stress. In the Finnish clilmate7etatttte, protective agents containing paraphenyle derivatives are required.

21422 APTIC NO. 40631

Stever, H. Guyford

NATIONAL SCIENCE FOUNDATION. CERTAIN MATERIALS RELATING TO INSTRUMENTATION FOR ENVIRONMENTAL MONITORING. NOTICE OF AVAILABILITY. *Federal Register, 37(88):9181, May 5, 1971.*

The National Science Foundation has engaged the Environmental Instrumentation Group of the Lawrence Berkeley Laboratory to conduct a survey of instrumentation for environmental monitoring. Instruments being investigated are those useful for measurements of air, water, radiation, and biomedicine related to environmental research and monitoring. Consideration is given to instruments and techniques presently in use and to those developed for other purposes with possible applications to this work. The results of the survey include descriptions of the physical and operating characteristics of available instruments, critical comparisons among instrumentation method, and recommendations for the development of new instruments and of promising methodology. The survey material is compiled in four looseleaf volumes which will be periodically updated. Volume one, which will be available in April 1972, covers sulfur dioxide monitoring, additional sections on nitrogen oxides, photochemical oxidants, mercury, lead, beryllium, and asbestos will be issued during the year.

Volume two will be available in late 1972. Volume three, which will be available in April 1972, covers ionizing radiation, including: accelerators, calibration methods, gamma radiation, X-rays, and neutrons. Microwaves, lasers, and ultraviolet radiation are also included. Additional sections on reactors, dosimeters, radionuclides, and infrared will be issued during the year. Volume four is expected to be available in late 1972.

21423 APTIC NO. 40791

Stockham, John and Howard Betz

STUDY OF VISIBLE EXHAUST SMOKE FROM AIRCRAFT JET ENGINES. (FINAL REPORT). *IIT Research Inst., Chicago, Ill, Federal Aviation Administration Contract DOT-FA69WA-2208, National Air Pollution Control Administration Contract 502-306-02X, Rept. FAA-RD-71-22, Rept. FAA-NA-71-24, 75p., June 1971. 15 refs.*

NTIS, DDC: AD 726249

The visibility of inflight jet exhaust is related to the Society of Automotive Engineers smoke number. A method based on photographic photometry was developed for measuring the optical density of smoke plumes. This method was related to visibility and to the smoke number through transmissometer measurements and visibility theory. A portable transmissometer, capable of operating over a wide range of optical path lengths and under varying ambient light conditions was fabricated. The mathematical expression relating the transmission measurements to the smoke number was derived. Liminal visibility requirements of smoke trails, developed from light scattering theory, were correlated with actual visual observations and the transmissometer and photometry measurements. Smoke numbers below 23 were associated with invisible exhaust plumes. Samples of exhaust smoke showed the particles to be composed of lacy agglomerates. At the nozzle, the geometric median particle diameter was 0.052 millimicron. At a distance of 10 nozzle diameters, the geometric median particle diameter was 0.13 millimicron at cruise condition. (Author abstract modified)

21424 APTIC NO. 40503

Stoeber, Werner, Hermann Flachsbart, and Christoph Boose

DISTRIBUTION ANALYSES OF THE AERODYNAMIC SIZE AND THE MASS OF AEROSOL PARTICLES BY MEANS OF THE SPIRAL CENTRIFUGE IN COMPARISON TO OTHER AEROSOL PRECIPITATORS. *J. Colloid Interface Sci., 39(1):109-120, April 1972. 13 refs.*

The spiral centrifuge, a new particle-size spectrometer for aerosols, facilitates the precipitation of aerosols in the size range from less than .000008 to .0006 cm in diameter. The particles are separated according to their aerodynamic diameter along a strip foil of 180 cm length. The calibration of the deposit strip in terms of aerodynamic diameters permits the determination of the size distribution by a count analysis. The mass distribution can be obtained by a gravimetric or, in case of a fluorescein test aerosol, by fluorometric analysis. Due to small irregularities of the deposition patterns, empirical corrections may apply to the experimental data. However, comparison of centrifuge results with data from other precipitators, such as electrostatic and thermal devices or cascade impactors, indicates that for three fluorescein test aerosols practically no corrections were necessary because of the random nature of the deviations. The spiral centrifuge gives consistent results over the whole size range investigated. With the aerosol entrance employed, substantial particle losses to the entrance section seemed to occur above .0002. (Author abstract)

21425 APTIC NO. 40060

Takagi, Shinji, Kazuhiko Endo, and Kazuma Kumai

STUDIES ON THE ERRORS IN THE DETERMINATION OF SULFUR DIOXIDE IN ATMOSPHERE BY WEST-GAEKE METHOD. *(Pararosanilin ho ni yoru kukichu no nisanka io sokutei no bunseki gosa no kento). Text in Japanese. Bunseki Kagaku (Japan Analyst) (Tokyo), 20(9):1097-1102, Sept. 1971. 8 refs.*

Errors in the determination of sulfur dioxide by the West and Gaeke method were investigated to determine necessary improvements. The reproducibility of the conventional West-Gaeke method was 6.4% in coefficient of variation, but improvements in sampling and spectrophotometric processes reduced this value to 2.0%. Results on a standard gas sample by using absorbing solution of 30 C indicated that values by the conventional method were approximately 9% lower than the calculated values. The collection efficiency of sulfur dioxide was 100%; the difference was due to the oxidation of sulfur dioxide by aeration in the absorbing solution. Effect of nitrogen dioxide, chlorine, hydrogen chloride, iron, or copper was avoidable. Sulfur dioxide in atmosphere was determined by the improved field method with errors of 1.3%. Improvements in the procedure included elimination of bias with calibration using standard gas; precise measurement of gas volume with a wet-type gas meter; and precise control of temperature in the spectrophotometric analysis. (Author abstract modified)

21426 APTIC NO. 40468

Thielke, J. F., R. J. Charlson, J. W. Winter, N. C. Ahlquist, K. T. Whitby, R. B. Husar, and B. Y. H. Liu

MULTIWAVELENGTH NEPHELOMETER MEASUREMENTS IN LOS ANGELES SMOG AEROSOLS. II. CORRELATION WITH SIZE DISTRIBUTIONS, VOLUME CONCENTRATIONS. *J. Colloid Interface Sci., 39(1):252-259, April 1972. 6 refs.*

Light scattering was measured in Los Angeles smog aerosols with two broad-band and one multiwavelength integrating nephelometers. Broad wavelength band light scattering correlated very highly with monochromatic light scattering. The four narrow-band coefficients were also highly correlated. A least-squares fit to a power-law size distribution was made, and the exponent correlated with the exponent (delta) of a power-law approximation of the wavelength dependence of scattering. The various regression equations compared well with the theoretical relationship alpha equals v-3, and the correlation coefficient between alpha and v ranged over 0.83, less than or equal to r less than or equal to 0.93. This result strongly supports the use of this technique for rapidly obtaining an index of size distribution. Calculated volume concentration and measured light-scattering coefficients had correlation coefficients around 0.8. The calculated volume concentration light scattering ratio is about one third of that determined empirically.

21427 APTIC NO. 39871

Thomas, Moyer D. and James O. Ivie

AUTOMATIC APPARATUS FOR THE DETERMINATION OF SMALL CONCENTRATIONS OF SULFUR DIOXIDE AND OTHER CONTAMINANTS IN THE ATMOSPHERE. *Interdepartmental Committee on Air Pollution, Washington, D. C., Air Pollut., Proc. U. S. Tech. Conf., Washington, D. C., 1950, p. 567-569. 10 refs. (May 3-5, Louis C. McCabe, ed.)*

Automotic and portable apparatus for the determination of small concentrations of sulfur dioxide, other gases, and aerosols in the atmosphere are critically reviewed. Each type of apparatus has advantages and disadvantages for particular purposes. The accumulation SO2 analyzers are useful when 30-minute average concentrations are adequate, though short time fluctuations can be approximated. The instantaneous-type sulfur dioxide analyzers show the short time fluctuations more clearly but require an accumulating feature for ease in summarizing the recording. Modifications of the apparatus for determination of hydrogen sulfid and other sulfur compounds or organic chlorine compounds are suggested. Hydrofluoric acid can be measured. An automotic sulfuric acid aerosol analyzer is described. The performance of portable apparatus for determining sulfur dioxide and aerosols is compared with that of the automatic analyzers. Continuous recordin is essential to a complete picture of atmospheric contamination at any location. (Author summary modified)

21428 APTIC NO. 40511

Treskunov, A. S.

PRINCIPLES OF DEVELOPMENT OF INSTRUMENTS FOR DETERMINING BACTERIAL CONTAMINATION OF THE AIR. *Biomed. Eng. (USSR) (English translation of Russian of: Med. Tekh.), 5(1):36-37, Jan.-Feb. 1971.*

Instruments for studying bacterial aerosols are based on two principles: determining the number of bacteria and their distribution by size in a one cu cm air sample; and, direct counting and the establishment of the species affiliation of the microorganisms. In developing equipment intended for monitoring rapid changes in the concentrations of pathogenic bacteria in the air, it is advisable to use inertial settling on a moveable layer of nutrient medium with a slotted impactor. In developing instruments for determining the total number of bacteria in the air, impingers should be used. With a POV-1 sampler it is possible to study the total bacterial contamination of the air and to detect bacteria which cannot be cultivated on artificial nutrient media. When the particle size of a biological aerosol is being studied, the use of multistage impactors is most efficient. In many instruments, settling is conducted on a nutrient medium. However, the use of a large number of physical methods that facilitate the initial identification and counting of the microorganisms is very difficult. One such method is photoelectric counting. However, this method is insufficient since it is impossible to determine the proportion of living and dead microorganisms. The use of domestic dyes is suggested as a means of determining the percentage of living and dead microorganisms. It is necessary to increase the number of instruments for determining bacterial contamination of the air.

21429 APTIC NO. 40138

Tsunoda, Fumio

WET COLLECTOR DETERMINATION OF WATER SOLUBLE FLUORIDE IN THE AIR BY THE ALIZARIN COMPLEXON EXTRACTION ABSORBANCE METHOD. *(Arizarin Kompurekuson chushutsu kyukodoho ni yoru Taiki chu Suiyosei Fukka butsu no Shishiki hoshu sokuteiho). Text in Japanese. Kankyo Hoken Reporto (Environ. Health Rept.), no. 8:31-32, Jan. 1972. 1 ref.*

The air was sampled by a regular air collector and after a test material absorption fluid in the sampling tube was filtrated, the alizarin complexon mixed solution was added to it to give a blue-purple color. Then, N, N-diethylaniline-isoamylalchol solution was added, and it was shaken and left to separate into two layers. The aqueous solution layer was thrown away. Next, to remove the turbidity in the remaining organic layer, the solution of acetic sodium trihydrate salt and glacial acetic acid in pure water was poured, stirred, and left to separate into two more layers. Again the aqueous solution layer was thrown away. The remaining organic layer was taken into a 10 mm cell and the absorbance was measured by comparison with a blank obtained through the same treatment without adding fluorine. Based upon the fluorine standard solution, a calibration curve was made by measuring the absorbance. The amount of fluorine was found with this curve, and the concentration of fluorine was calculated in the air. The quantitative analysis can be made on up to 0.5 millimicron of F in a test material solution of 30 ml.

21430 APTIC NO. 40808

Uthe, Edward E.

STUDY OF LASER BACKSCATTER BY PARTICULATES IN STACK EMISSIONS. *Preprint, American Chemical Society, Washington, D. C.; American Inst. of Aeronautics and Astronautics, New York; Environmental Protection Agency, Washington, D. C.; Inst of Electrical and Electronics Engineers, New York; Instrument Society of America, New York; National Aeronautics and Space Administration, Washington, D. C., 4p., 1971. 12 refs. (Presented at the Joint Conference on Sensing of Environmental Pollutants, Palo Alto, Calif., Nov. 8-10, 1971, Paper AIAA 71-1087.)*

To investigate the validity of determining smoke plume opacity or particulate content by laser backscatter measurements, particulates of known size distribution, shape, and refractive properties were pneumatically injected into a specially designed 30 foot chamber. The generated aerosol was observed by both Q-switched ruby (0.6943 micron) and neodymium (1.06 micron) lidars located 500 ft from the chamber. Analysis of the backscatter data was in terms of transmission as determined by a white light transmissometer. Results from initial experiments using fly ash collected from a coal burning power plant and classified into various size fractions are presented.

21431 APTIC NO. 40333

Walton W. H.

THE APPROACH TO AIRBORNE MEASUREMENT IN BRITISH COAL MINES. *Staub (English translation from German of: Staub, Reinhaltung0 Luft), 29(3):32-38, March 1969. 19 refs.*

Modifications of dust standards and methods of measurement are discussed. The dust standards are not fixed by law, are agreed upon by a National Joint Pneumoconiosis Committee and other interested parties. The 1949 standards were expressed during periods of maximum dust production and were inaccurately defined, so a new elaborate system of training and check counting had to be established. This period had to be taken to be the whole period of active work during the shift. Dust standards must relate to the dustiest (time-averaged) conditions in which men work for protracted periods. Distribution of the coal face concentrations has been examined at the mines studied by the Pneumoconiosis Field Research, and on the average, 7% of coal workers were exposed to dust concentrations of twice the mean for the mine. The introduction of full-shift sampling at fixed stations with instruments such as the Long Running Thermal Precipitator (LRTP) and the Mining Research Establishment (MRE) gravimetric sampler, which operate without supervision, requires a different approach compared with the traditional procudure in which a dust officer tours the mine and takes samples over short periods at different workplaces. Gravimetric instruments are carried by mine-workers, with periodical inspection and control sampling by an investigator, and similar methods are under consideration for routine dust sampling.

21432 APTIC NO. 39892

Ward, A. B.

MEASUREMENT OF AIR POLLUTION: ABSORPTION OF SULPHUR DIOXIDE BY TEFLON WOOL. *Warren Spring Lab., Stevenage (England), LR120(AP), 8p., April 1970. 5 refs.*

Samples of brown and white Teflon wool were examined to determine the absorption of sulfur dioxide when the material was used as a prefilter for SO2 recorders. Both materials showed a final absorption of 5%. However, the white Teflon was more consistent in results, had an initial absorption of 15% against 25% for the brown Teflon, and fell to the final level within 2 hr against 4-5 hr for the brown. (Author abstract modified)

21433 APTIC NO. 39869

Washburn, Harold W. and Robert R. Austin

THE CONTINUOUS MEASUREMENT OF SULFUR DIOXIDE AND HYDROGEN SULFIDE CONCENTRA-

TIONS BY AUTOMATIC TITRATION. *Interdepartmental Committee on Air Pollution, Washington, D. C., Air Pollut., Proc. U. S. Tech. Conf., Washington, D. C., 1950, p. 596-602. (May 3-5, Louis C. McCabe, ed.)*

An apparatus called the Tritilog which combines chemical adsorption with automatic titration to give relatively specific analyses for sulfur dioxide and hydrogen sulfide in the atmosphere is described. The apparatus consists essentially of a chemical cell in which titration takes place and of a DC amplifier which senses the end point potentiometrically and generates the titration electrolytically. If both H2S and SO2 are present in the air, the contaminated air sample is first run through the instrument directly and the total titration level determined. The sample stream is then automatically switched to run through a filter, which by precipitation, removes the hydrogen sulfide quantitatively without affecting the SO2. The amplitude of the record when the sample is running through the filter is a measure of the amount of sulfur dioxide present, and the difference between this amplitude and that obtained when no filter is used is a measure of the H2S present. The Tritilog does not titrate sulfur trioxide, carbon monoxide, hydrogen, carbon disulfide, carbonyl sulfide, or ammonia. Other features are its speedy response, light weight, and quantitative results independent of temperature.

21434 APTIC NO. 40320

Westwater, Ed R.

MICROWAVE DETERMINATION OF LOW ALTITUDE TEMPERATURE PROFILES. *Michigan Univ., Center for Remote Sensing Information and Analysis and Environmental Protection Agency, Washington, D. C., Wastes Quality Office, Proc. Symp. Remote Sensing Environ., 7th, Ann Arbor, Mich., 1971, vol. 1:585-594. 10 refs. (May 17-21.)*

Passive ground-based radiometric measurements of thermal emission by oxygen were used to provide significant information about low altitude temperature structure. Theoretical results indicate that radiometric measurement accuracies of 1 K can be obtained up to 2 km by inversion of fixed-frequency, angular-scan radiometer data with noise levels of 1 K. Statistical inversion techniques are applied to angular scan data to recover various types of temperature profiles. Analysis of several sets of such fixed-frequency variable angle data indicates the potential use of ground-based microwave measurements in air pollution forecasting. Statistical inversion of radiometer data yielded successful retrievals of lapse and ground-based inversion temperature profiles. The existence of elevated inversion was inferred from the data, but with poor height resolution. The mixing depth associated with an elevated inversion can be estimated to within about 10%, but retrieval of more detailed information is difficult.

21435 APTIC NO. 39876

White, Charles E.

FLUOROMETRIC ANALYSIS. *Interdepartmental Committee on Air Pollution, Washington, D. C., Air Pollut., Proc. U. S. Tech. Conf., Washington, D. C., 1950, p. 196-200. 18 refs. (May 3-5, Louis C. McCabe, ed.)*

Techniques employing the measurement of fluorescence permit the qualitative and quantitative determination of trace amounts of some elements more accurately than by any other means. Fluorometric procedures, for which many of the reagents are highly specific, making separations unnecessary, involve excitation of the material with some high energy source and measurement of the visible light produced. Sources of excitation, types of fluorometers and filters, and glass standards are discussed. Determinations of aluminum, beryllium, boron, thallium, uranium, gallium, and aromatic compounds in gasoline are described to illustrate the application of fluorescence to trace analysis. Fluorescent acid-base indicators are especially adaptable to titrations in dark, cloudy solutions and are used in the oil industry in volumetric analysis.

21436 APTIC NO. 40055

White, Kenneth O., E. Howard Holt, Stuart A. Schleusener, and Robert F. Calfee

ERBIUM LASER PROPAGATION IN SIMULATED ATMOSPHERES II. HIGH RESOLUTION MEASUREMENT METHOD. *Army Electronics Command, White Sand Missile Range, N. M., Atmospheric Sciences Lab., DA Task IT061102B53A-19, TR-ECOM-5398, OSD-1366, 14p., Aug. 1971. 14 refs.*

NTIS: AD 731211

The transmission of laser energy in a carbon dioxide medium was measured in the 1.54 micron spectral region with a nominal resolution of 0.02 nanometer. An erbium laser was used which has two output emission regions in the eye-safe realm of the spectrum; one region centered at 1.536 micron and 1.0 nanometer wide and the other centered at 1.543 micron and 2.0 nanometer wide. The CO2 sample was contained in a pressure and temperature controlled, 20-meter long, white cell. The monitor and transmitted laser pulses were detected by germanium photodiodes and recorded on a dual parameter pulse-height analyser which provided a real-time indication of the transmission and the quality of the data. A spectral scan over the laser output was obtained by sending a portion of the laser bean through a 3.3-meter grating- spectrometer which was present to a narrow (about 0.01 nm) spectral region within one of the two output regions of the laser. A signal from the spectrometer was used to trigger the analyzer to accept only those laser spikes with wavelengths which fall within the preset wavelength window of the spectrometer. The spectrometer was scanned over the laser output and the transmission obtained as a function of wavelength. Data and theoretical calculations are presented for a 480-meter path length, a temperature of 30 C, and a CO2 pressure of 660 torr. The agreement between the theory and experiment was within the experimental uncertainties. (Author abstract)

21437 APTIC NO. 39934

Whytlaw-Gray, R., J. B. Speakman, and J. H. P. Campbell

SMOKES: PART I.--A STUDY OF THEIR BEHAVIOR AND A METHOD OF DETERMINING THE NUMBER OF PARTICLES THEY CONTAIN. *Proc. Roy. Soc. London, 102(A718):600-615, Feb. 1, 1923. 19 refs.*

Theoretically, at least, systems of solid particles of ultramicroscopic size suspended in a gaseous medium should show many resemblances to those analogous systems in which the dispersion medium is a liquid. It might be expected that the well-known characteristics of colloidal matter would have their counterpart in the simpler gaseous systems. Dusts, fumes, smokes, and clouds are colloidal systems possessing varying degrees of stability, dispersion, and concentration, which sometimes flocculate or precipitate rapidly, sometimes remain highly disperse for long periods of time, and correspond to the many types of liquid systems which vary from coarse suspensions to fine textured sols. Corresponding systems in the gaseous phase can be prepared and can exist for measurable periods in a stable state. A reliable method is worked out for determining the number of particles in a given volume of a dispersoid. To illustrate the method, details of an earlier experiment in which a zinc oxide dispersoid is formed by decomposition of zinc ethyl are given, showing how the data were obtained and computed. Accuracy of the counting is considered, as well as growth of the particles.

21438 APTIC NO. 39874

Williams, Van Zandt

INFRARED SPECTROSCOPY. *Interdepartmental Committee on Air Pollution, Washington, D. C., Air Pollut., Proc. U. S. Tech. Conf., Washington, D. C., 1950, p. 236-240. 5 refs. (May 3-5, Louis C. McCabe, ed.)*

The molecular basis of infrared analysis is explained and its three main research uses reviewed: fingerprint identification of unknowns, quantitative analysis (the most widely used in industry and the most potentially useful in air pollution problems), and qualitative organic analysis. The principles of operation of the IR spectrometer and the non-dispersive IR gas analyzer are briefly described. There are few published data on air pollution applications of the IR spectrometer, probably because, with the gas sample cell length usually used, the normal sample concentration is 10,000 or 100,000 ppm as opposed to the concentrations of 1-10 ppm usually associated with air pollution. A hypothetical method to alter the cell length and increase the sensitivity is proposed. The sensitivity of the IR spectrometer and gas analyzer are compared, based on very preliminary performance data for the latter.

AIR QUALITY MEASUREMENTS

21439 APTIC NO. 40046

Study Group on Broad-Area Air Pollution Control (Japan)

A REPORT ON PLANNING AIR POLLUTION CONTROL (THE WEATHER AND AIR POLLUTION CONDITIONS AROUND THE BAY OF OSAKA). *(Taikiosen kanri keikaku ni kansuru kenkyu hokoku-sho. (Osaka-wan shuhen no kisho narabini taikiosen)). Text in Japanese. 111p., March 1971.*

The air pollution maps classified by year and season were made on the basis of measurement results of sulfur oxides concentrations at 56 spots in Kyoto, Osaka, Nara, and Wakayama Prefectures around the Bay of Osaka in 1968 and 1969. In 1968, yearly average values were above 0.05 ppm in Osaka City, the south part of Amagasaki City, East Osaka City, the northeast part of Sakai City, and a part of Kyoto City. In 1968, above 0.05 ppm was observed throughout the year in these areas, but more than 0.05 ppm was recorded in some areas of Wakayama District only in the summer and winter. In 1969, above 0.05 ppm was seen throughout the year in Wakayama District. The Osaka Bay area was divided into 13 blocks and the characteristics of polluted conditions were examined for each block. In 1968, a yearly average value was 0.05 ppm in three blocks such as Osaka City, Amagasaki City, and the north part of Osaka Prefecture; in 1969, the east part of Osaka Prefecture was added to these three blocks. Above 0.06 ppm was obtained in Osaka and Amagasaki City in these 2 years. When smog warnings were issued, the relationship between the weather conditions was examined in Kyoto, Osaka, and Hyogo Prefecture during 10 days, and the obvious characteristics of the area were recognized in the direction and the velocity of the wind during smog warning periods. Smog warnings were issued on Dec. 15-19, 1970 and Jan. 10-14, 1971. Changes in the weather and polluted conditions were analyzed concerning hour and day. Pollution related to the neighboring industrial area was observed in Kyoto, Osaka, and Kobe Districts, whereas the relation did not exist in both Himeji and Wakayama Districts.

21440 APTIC NO. 40118

SUMMARY OF THE RESULT OF INVESTIGATION ON ENVIRONMENTAL POLLUTION BY AUTOMOBILE EXHAUST GASES AND NOISE OF CARS. *(Jidosha haishuisu gasu kankyoosen narabini jidosha souon chosakekka no gaiyo). Text in Japanese. 10p., 1971.*

Measurement was carried out at 24 places on a highway in Amagasaki City and other 17 cities or towns during July 12 and September 21, 1971. The maximum average value of carbon monoxide/hr for 24 hr was 7.6 ppm at the Kuisegi-cho intersection of Amagasaki City. The maximum value of nitric oxide was 0.220 ppm at Cukuchi intersection of Amagasaki City, and nitrogen dioxide was 0.46 ppm at Fudabe intersection of Nishimoniya City. The maximum concentration of lead during 8 hr in the daytime was 2.560 micrograms/cu m and was higher at places with heavy traffic volumes. Automobile exhaust gases thus affected lead pollution. The maximum level of suspended particulate matter was 0.069 mg/cu m at the Shitamachi intersection of Ono City. The maximum amount of total airborne dust was 2.19 mg/cu m at the Midorigaoka intersection of Itami City. The maximum concentration of sulfur oxides was 0.043 ppm at Kobe City, Hanshin highway, and Uosaki Shinbori lump. Since all the places with high concentration of SOx were closed to industrial districts, emission gases from the factories affected the pollution. These measured values were lower than the environmental standard for each pollutant. All the values except the concentration of lead and SOx increased compared with the results of measurements in the previous year.

21441 APTIC NO. 40363

Tokai Metropolitan Government (Japan)

TRENDS IN MEASUREMENTS OF SULFUR DIOXIDE AND DUSTS IN TOKAI CITY. *Text in Japanese. 4p., March 1972.*

Monthly fluctuations of sulfur oxides (sulfur dioxide and trioxide) measured by automatic measurement equipment and by the lead oxide method, and fluctuations of settling particles are presented in table forms. Comparisons of sulfur oxides measurements and environmental standards are presented by graphs. Automatic measurements were taken at five locations in Tokai for 1970 and 1971. Individual monthly measurements ranged from 0.021 ppm in May and June at one location to 0.089 ppm in February at another location. The highest single measurement of sulfur trioxide by the lead dioxide method was 4.99 mg/100 sq cm/day, and the lowest was 0.48 mg/100 sq cm/day. Of the 18 locations where SO3 measurements were taken, the highest daily average was 3.99 mg and the lowest was 0.87 mg throughout 1970 and 1971. Winter months from November through February showed higher sulfur oxides concentrations in general. Comparisons of measurements and environmental standards revealed an overwhelmingly heavy SOx concentration for 1970 at all five locations where automatic measurements were taken: all five, but in particular two or three locations, showed a notable improvement in 1971. The amount of settling particles measured at five locations varied from 5.78 tons/sq km/mo in August at one location from 23.72 tons/sq km/mo in March at another location for single measurement. No particular patterns were found for settling particles.

21442 APTIC NO. 40429

Tokyo Metropolitan Government (Japan), Dept. of
Construction and Public Nuisance

RESULT OF MEASUREMENT OF AIR POLLUTION BY AUTOMATIC RECORDER. NO. 4. *January-December 1971. (Taikiosen jidokirokukei sokutei kekka hokoku. NO. 4. Showa 46-nen 1-gatsu - 12-gatsu). Text in Japanese. 71p., March 1972.*

Air pollution in Tokyo (Ota Ward) was investigated based on the data obtained by an automatic recorder of air pollution. Average concentration of sulfur oxides/year in 1971 was 0.043 ppm. This value was significantly lower compared with the values of 0.055 ppm in 1969 and 0.056 in 1970. Also, it was lower than the environmental standard value of 0.05 ppm. In different months, the concentration of SOx was lower in autumn, but did not show a decrease as found in the spring of 1969 and 1970. The annual mean value (transmissivity) of suspended particulate matter was 13.0% in 1969, 10.5% in 1970, and 9.3% in 1971, and showed a decreasing tendency. Its value was lower in summer and lowest in August. It was below the annual mean value in December and was 8.2%, which was lower than that of the rest of the year. High concentrations of SOx (over 0.1 ppm) decreased by more than half compared with the data of 1969 and 1970. Compared with an ordinary year, the same tendency was found on other items and no local changes were observed.

21443 APTIC NO. 40574

SWAIN S REPORT ON SMOKE IN SALT LAKE VALLEY. *Chem. Met. Eng., 24(11):463-465, March 16, 1921. 2 refs*

During Feb. 1920, a smoke suit was decided against the American smelting and Refining Co. and the United States Smelting, Refining and Mining Co., allowing their smelters at Murray and Midvale respectively to continue operations under certain conditions and under observation of a staff headed by Prof. R. E. Swain of Stanford University. A summary is presented of a year s research by eight assistants and Prof. Swain, indicating that there was no damage whatever by sulfur dioxide even to the extent of questionable foliar markings on the most sensitive plants in the Murray district. During the growing season, 4386 determinations of SO2 were made on the air of this district at locations which were as nearly as possible in the line of movement of the roaster stack gases. The average human adult, who is already acquainted with the odor of SO2, will first be able to detect it at a concentration of 3-3.5 ppm, while the average person not well acquainted with the smell could detect the gas at a concentration of from 4-5 ppm. A survey of the entire record of atmospheric tests in the Murray district, amounting to 5923 single determinations, shows that only 19 of these represent a concentration of 3 parts or more per million, and only one a concentration of 6 ppm. Both plants employ the Dwight-Lloyd and the Wedge type of roasting furnaces, and the amount of leakage from these furnaces is small, owing to their construction and to the good draft maintained. There were no indications that the lead and arsenic losses were objectionable at the Murray plant. Soot fall experiments are also indicated. The Midvale plant, on the other hand, at times during the past season was an agent of injury to the vegetation of the neighboring district. Remedial steps are recommended, as well as guarantees and restrictions.

21444 APTIC NO. 40673

Shizuoka Municipal Government (Japan)

GENERAL CONDITION OF PUBLIC NUISANCE IN SHIZUOKA CITY. *(Shizuoka- shi ni okeru kogai no gaikyo). Text in Japanese. 85p. 1971.*

The number of complaints made against air pollution in 1970 by the citizens of Shizuoka included 48 cases against dust, 35 cases against soot, 9 cases against gas, and 40 cases against odor. Thirty-six cases of dust episodes, 29 of soot episodes, seven of gas, and 30 of odor were investigated and solved. Continuous measurements of sulfur dioxide were taken using five automatic meters from May 1970 to April 1971. Measurements taken at the City Hall and another location showed that the hourly measurements were less than 0.2 ppm 100% of the time, and approximately 91 to 97% of the year the daily average of hourly measurements were less than 0.05 ppm. Approximately 99% of the time, the hourly measurements were less than 0.1 ppm. These figures were all far better than the environmental standards. The daily fuel (oil) consumption of Shizuoka city is 270 kl, and the single largest consumption is 70 kl by one industry. Other industries generally consume less than 18 kl daily, and the plants are scattered throughout the city. There is no concentration of emission sources. Suspended particulates measurements ranged from 90 micrograms/cu m in a commercial area to 288 micrograms/cu m in a residential area, among 22 locations that were tested. Findings in the wind directions, wind velocity, SO2 concentration, automobile emission gas concentration, carbon monoxide, and traffic volumes are presented in tables.

21445 APTIC NO. 40538

Berner-Moundrea, Vassiliki

FLUCTUATIONS OF THE NO2 CONCENTRATION IN THE GROUND-LEVEL ATMOSPHERE OF VIENNA. *(Schwankungen der NO2-Konzentration in der bodennahen Atmosphaere von Wien). Text in German. Staub, Reinhaltung Luft, 32(5):210-212, May 1972. 6 refs.*

Nitrogen dioxide absorbs light in the visible range of the spectrum which is strongest between 5095 and 4081 A. It therefore can be measured by the optical method, which was used for NO2 measurements taken in Vienna between April 12, 1966 and May 19, 1966. The NO2 concentration was measured hourly. The diurnal concentrations showed a marked minimum in the noon-period. Sometimes a minimum was found during the night hours between 11 p.m. and 5 a.m. The minima coincided with the traffic density. A pronounced influence of the weather conditions on the ground-level NO2 concentration could also be observed. The diurnal average NO2 concentrations ranged from 0.02 ppm to 0.03 ppm with maximum values reaching 0.10 and 0.12 ppm.

21446 APTIC NO. 39981

Chovin, P.

DISCUSSION CONTRIBUTION NO. 6. *(Diskussionsbeitrag Nr. 6). Text in German. Staub, Reinhaltung Luft, 32(2):80-84, Feb. 1972.*

Results of carbon monoxide concentration measurements at six stations in Paris, carried out from March 1 to Sept. 30, 1971, are reviewed. The daily variations showed minimum concentrations between 1 and 6 am, and three maxima between 8 and 9 am, at 2 pm and at 6-8 pm on workdays, and increasing concentrations from 1 to 12 pm were observed on Sundays. The daily average for the above period was 8.7 ppm. The concentrations were highest in June, and lowest in both April and August. The mean value for daily 8-hour periods was 10.0 ppm. A Paris subway strike from Oct. 5 to 14, 1971 caused the averages to increase by 17% and by 85%, compared to the previous week and the 7 previous months, respectively. Also the frequency of concentrations exceeding the 30 and 40 ppm limits increased. As a whole, the hourly means were relatively high, while the frequency of concentrations above the 30 and 40 ppm limits was, except for the strike period, tolerable during the period investigated.

21447 APTIC NO. 40790

Craxford, S. R. and Marie-Louise P. M. Weatherly

DISPERSAL OF AIRBORNE EFFLUENTS. AIR POLLUTION IN TOWNS IN THE UNITED KINGDOM. *Phil. Trans. Roy. Soc. London Ser. A, vol. 269:503-513, 1971.*

Data from daily observations of smoke and sulfur dioxide taken over the past 10 yrs at some 1200 sites throughout the United Kingdom are examined to assess changes that have been occuring in levels of pollution in relation to changing patterns of fuel consumption. Smoke emissions decreased by 60% from 1951 to 1968 despite a 10% increase in population and a 17% increase in annual gross energy consumption. This decrease is attributed to the use of oil, rather than coal, by industries and for domestic heating. Pollution levels in towns in different parts of the United Kingdom are compared. In the towns in the south the smoke concentration is only one-third to one-half that in northern towns. The part that aerodynamicists, architects, and town planners can play in reducing urban pollution is discussed. The town planner can help to eliminate the open fire as a means of domestic heating. Sulfur dioxide pollution is less serious, but its reduction is more costly than smoke control. It is in this area that the architectural aerodynamicist as well as the town planner can be of help; ground level concentrations can be reduced by proper dispersion of chimney efflents more economically than by reducing the emissions.

21448 APTIC NO. 40772

Deleanu, M. and E. Gross

PRELIMINARY DATA ON AIR IONIZATION NEAR A STEEL WORKS AND USE FOR ESTABLISHING DEGREE OF POLLUTION. *(Date preliminare asupra ionizarii aerului intr-un centru industrial siderurgic in scopul stabilirii unui indice de impurificare). Text in Rumanian. Ig. Microbiol., Epidemiol., 1956:60-70, Jan.-March 1956. 10 refs.*

Atmospheric ion concentrations were determined during the first week of June and the last week of October under 70-80% humidity conditions near a steel processing plant. Ionization data characterizing the area at distances of 300-500 m, 2000 m, and 4.0- 15.0 km from the main emission source are presented. Ion concentrations measured by means of an ion counter are expressed in amount of ions per ml. Small ion concentrations of both signs were lowest within the 300-500 m area. Large ion concentrations were high throughout the 2000 m radius around the emission source. The ionic coefficient of air pollution, that is, the ratio between the large and small ion total amounts, was 50 in the 300-500 m area, ranged between 14 and 39 through the 2000 m area, and was below 10 in the communities located at 4.0-15.0 km from the source. No correlations between the air current direction as determined by the smoke direction and the atmospheric ionization data could be ascertained. The eventual utilization of atmospheric ionization as a parameter for the characterization and mapping of air poilution around certain industrial areas is discussed.

21449 APTIC NO. 40343

Dobler, Leonard A.

A PILOT STUDY OF RUSH-HOUR CONCENTRATIONS OF CERTAIN AUTOMOBILE RELATED POLLUTANTS AT SELECTED LOCATIONS. *Preprint, Denver City and County Colo., Air Pollution Control Section, 7p., Dec. 1971.*

Bag samples can be easily collected at remote sites and analyzed at the Continuous Air Monitoring Program (CAMP) stations. Samples were taken in the morning rush-hour on different days. The open end of the probe was 8 ft above the grade where the sampler was located. The concentrations of automobile-related pollutants was high in the immediate vicinity of all intersections of major thoroughfares in the metropolitan area during rush-hour traffic. However, it cannot be assumed that concentrations measured at different locations will vary in direct proportion to traffic volume. Data is given for carbon monoxide, hydrocarbons, and nitrogen oxides measured at various sites in Denver.

21450 APTIC NO. 40291

Fujimura, Yutaka

STUDIES ON THE TOXICITY OF MERCURY (HG SERIES NO. 7) 2ND REPORT. ON THE PRESENT STATUS OF MERCURY CONTAMINATION IN ENVIRONMENT AND FOODSTUFFS. *(Suigin no dokusei ni kansuru kenkyu (Hg series no. 7) Dainiho Kankyo oyobi shokuhin no Hg osen). Text in Japanese. Japan. J. Hyg. (Tokyo), vol. 18:402-411, 1964. 12 refs.*

An investigation of the present status of mercury contamination in Japan showed atmospheric mercury levels of 1.2-18.0 micrograms/cu m in urban areas. Increases in concentrations were proportional to traffic volume; in city areas isolated from traffic, concentrations were similar to rural area (1.2-2.4 micrograms/cu m). Mercury levels in rivers and ditches in Tokyo were 10 times higher (0.004-0.1 ppm) than in rural regions, indicating contamination from industrial waste. Rain and snow in urban areas contained 0.0006 ppm mercury. In the country, soil and rice field levels were 0.36-0.38 ppm; levels in dust on heavily travelled Tokyo streets were 0.018-0.02 ppm. Values for polished and unpolished rice treated with organic mercurials against a rice fungus disease were relatively high (0.03-0.14 ppm). Rice bran contained 0.21-2.3 ppm mercury, suggesting the fat-soluble property of organic mercury. Figures for refined wheat flour and its bran components were comparable (0.05-0.06 ppm). Meat, dairy products, and fish contained less than 0.1 ppm mercury, while vegetables and fruits contained 0.05-0.06 ppm. Extraordinarly high levels were found in chickens (0.16 ppm), egg yolks (0.3-0.7 ppm), and tuna meat (0.5 ppm). Rice bran in feed is suspected as the cause of the contamination of chickens and eggs.

21451 APTIC NO. 40096

Goodrich, John C. and Gail Howrigan

COMPUTER MAPPING AS AN AID IN AIR POLLUTION STUDIES. VOLUME I. SUMMARY REPORT. APPENDIX. COMPUTER GRAPHICS. *Harvard Univ., Cambridge, Mass., Lab. for Computer Graphics and Spatial Analysis, National Air Pollution Control Administration Demonstation Grant 68A-2405D, Rept. APTD-0796, 50p., April 1970.*

NTIS: PB 204147

A complete set of all graphics shown in volumes I and II of a study of computer mapping as applied to air pollution studies is given. Maps include St. Louis, California, Los Angeles, Montreal, Kansas City, Puget Sound, southern New England, Boston, Philadelphia, and Connecticut on subjects such as land use, sulfur dioxide readings, suspended particulates, census data, diffusion of SO2 from power plants, daily pollution averages, dust fall, annual concentration rates, socio-economic factors, urban-rural comparisons, carbon monoxide concentrations, and oxidant concentrations.

21452 APTIC NO. 39914

Harrison, Paul Roger

AREA-WIDE DISTRIBUTION OF LEAD, COPPER, CADMIUM, AND BISMUTH IN ATMOSPHERIC PARTICLES IN CHICAGO AND NORTHWEST INDIANA: A MULTI-SAMPLE APPLICATION OF ANODIC STRIPPING VOLTAMMETRY. *Michigan Univ., Ann Arbor, Environmental Science Dept., Thesis (Ph.D.), Ann Arbor, Mich., Univ. Microfilms, Inc., 1970. 427p. 52 refs.*

The elemental composition of aerosols was determined on an area-wide, simultaneous basis in the southern Lake Michigan region in order to exhibit the feasibility and usefulness of such studies. Lead, copper, cadmium, and bismuth were analyzed from standard glass fiber filters obtained from the local high volume sampling networks in Chicago and Northwest Indiana. During the analysis of these samples the highly sensitive techniques of anodic stripping voltammetry were documented, and the physical characteristics of the cell design and hardware were further improved for routine use with multiple analysis. When comparisons with estimations of source strengths and distributions were tried the results suggested that lead aerosols were emanating almost completely from automobiles, whereas most of the cadmium and nonanomalous copper aerosols can be explained by fuel-burning sources. (Author abstract modified)

21453 APTIC NO. 40686

Hartmannsgruber, R.

SPECIAL OBSERVATIONS AT THE HOHENPEISSENBERG METEROLOGICAL OBSERVATORY NO. 14. DETAILED AEROLOGICAL CHARTS OF BALLOON OZONE MEASUREMENTS CARRIED OUT WITHIN THE FRAMEWORK OF THE INTERNATIONAL OZONE BALLOON COMPARISON, HELD FROM 1.19 T 2.6 1970. *(Sonderbeobachtungen des Meteorologischen Observatoriums Hohenpeissenberg Nr. 14. Ausfuehrliche aerologische Tabellen der Ozonsondierungen im Rahmen des Internationalen Ozonsondenvergleichs vom 19.1. - 6.2. 1970). Text in German. Meteorologisches Observatorium Hohenpeissenberg (West Germany), Rept. 14, 216p., June 1971.*

NTIS: N7215379

Detailed aerologic charts of ozone measurements, carried out within the framework of the International ozone balloon test at the Hohenpeissenberg Meteorological Observatory from Jan. 19 to Feb. 6, 1970, are presented. Six different ozone test balloons of a wet chemical type were compared in a total of 41 tandem releases. The charts contain data on the partial ozone pressure and the molecular mixture ratios. The Dobson reduction was applied. Data characterizing the conditions of the balloon probing (altitude, barometric pressure, air temperature, dew point, relative air humidity, wind direction, wind velocity, pseudopotential temperature, modified refractive index for radio waves, air density, sound velocity, and ozone partial pressure) are compiled in another set of charts.

APTIC NO. 40722

21454

Hartmannsgruber, R.

SPECIAL OBSERVATIONS AT THE HOHENPEISSENBERG METEOROLOGICAL OBSERVATORY NO. 1. RESULTS OF AEROLOGIC BALLOON OZONE MEASUREMENTS AND TOTAL OZONE MEASUREMENTS DURING THE FIRST SIX MONTHS OF 1971. *(Sonderbeobachtungen des Meteorologischen Observatoriums Hohenpeissenberg Nr. 1. Ergebnisse der aerologischen Ozonsondierungen und der Gesamtozonmessungen im 1. Halbjahr 1971). Text in German. Rept. 15, 159p., Aug. 1971.*

NTIS: N7215380

Results of balloon ozone measurements and total ozone measurements, carried out at the Hohenpeissenberg Meteorological Observatory during the first 6 months of 1971 are presented. Brewer-Mast cells as well as Dobson 104 type ozone spectrophotometers were applied. Date, time, wavelength pairs applied, type of measurement applied (direct sun or blue zenith), the relative length of the path of the rays through the ozone layer, and the total ozone above the station, as reduced to normal conditions, are specified in the total ozone charts. The ozone charts contain data on total barometric pressure, air temperature, adjusted ozone partial pressure and adjusted molecular mixture ratio. The corrections on the basis of the total ozone measurements were performed by using the Dobson reduction. Total ozone, integrated ozone, residual ozone as well as the correction factor applied are contained in the ozonograms. The conditions of the balloon releases (altitude, barometric pressure, air temperature, dew point, relative humidity, wind direction, wind velocity, pseudopotential temperature, modified refractive index for radio waves, air density, sound velocity and ozone partial pressure) are compiled in a separate set of charts.

APTIC NO. 40306

21455

Holzworth, George C.

ATMOSPHERIC CONTAMINANTS AT REMOTE CALIFORNIA COASTAL SITES. *J. Meteorol., vol. 16:68-79, Feb. 1959. 21 refs.*

Air composition at remote sites near the California coast was studied with emphasis on relationships between air samples of particulate materials and oxidants, and trajectories computed to determine the areas from which the sampled air came. Twelve-hour particulate smaples were collected using a high-volume sampler adapted to the use of flat sheets of filter media; samplers were analyzed for total weight, benzene soluble organic matter, chloride, sulfate, and nitrate. Oxidants were measured at San Nicholas and San Clemente using continuous oxidant recorders that utilize a potassium iodide reagent. One-a-day oxidant hand samples using phenolphthalin reagent were obtained at Farallon, Crescent City, and Mt. Hamilton. Trajectories were based on surface winds and the sea-level isobaric pattern. High chloride concentrations were associated with nearby heavy surf conditons. Although the one-a-day phenophthalin oxidant measurements show variations with time and between sites, these data agree with previously observed background concentrations. The continuous oxidant measurements were not as conclusive, possibly because of man-made contamination trasported from an urban origin to the particular sampling sites.

APTIC NO. 40120

21456

Iwamoto, Yoshitora, Yoshihiro Ikeda, and Tadashi Hamazaki

INVESTIGATION ON AIR POLLUTION. PART I. INVESTIGATION OF AIR POLLUTION IN KARATSU DISTRICT, INCLUDING THE DATA OF AIR POLLUTION IN SAGA PREFECTURE (JANUARY 1967-DECEMBER 1970). *(Taikiosen ni kansuru chosa; dai 1 po. Saga-ken Karatsu chiku taiki chosa hokoku. Fukenka no taikiosen chosa jokyo (Showa 42-nen 1-gatsu - Showa 45-nen 12-gatsu)). Text in Japanese. Saga-Ken Eisei Kenkyusho-Ho, Rep. Saga Prefect. Inst. Public Health), no. 9:55-72, Nov. 1971. 7 refs.*

The amount of dust fall was measured by a deposit gauge, and amounts of the soluble and unsoluble content were calculated. Sulfur trioxide was measured by the lead dioxide method. The precipitation and pH value of rain were also measured. Average dust fall was over 10 tons/mo. The relationship between air pollution and dust fall was observed. In the electric power industry in Karatsu district, fuel oil has been gradually replacing coal; this is closely related to the decreasing level of dust fall and to the decreasing level of tar in the unsoluble content of dust. Dust fall was greater in autumn (July to September) than in spring and winter, which was related to precipitation. The SO3 was higher in winter and spring, due to the fact that the inversion layer is low in these seasons.

APTIC NO. 40506

21457

Kitamura, Yoshihiko and Hidemi Kurita

INVESTIGATION OF AIR POLLUTION IN NAGANO PREFECTURE. PART 3. DUST FALL IN NAGANO PREFECTURE. *(Nagano-ken no taikiosen chosa dai 3-po. Nagano-ken no kokabaijin (Showa 45-nen)). Text in Japanese. Nagano-ken Eisei Kogai Kenkyusho Chosa Kenkyu Hokoku (Bull. Nagano Prefect. Inst. Public Health Public Nuisance), no. 95:1-59, July 1971.*

Measurement of dust fall in Nagano Prefecture in 1970 was carried out at 20 points which were the same as in the previous year and at three new points. The average height of the measuring point was 11.9 m, which was slightly higher than that of the previous year. The result was shown in a logarithmic table. The average amount of dust fall/year at different points was 3.94 g/sq m/30 days, which decreased 30% compared with the value of the previous year. All components except sulfate decreased from 1967. The same relationship between soluble ignition loss, soluble solidash, calcium sulfate, and respiration as in the previous year were obtained, but the relationship between the amount of dust fall and the insoluble portion was not cleared.

APTIC NO. 40412

21458

Kornienko, A. P., V. R. Tsulaya, and S. Ye. Katkova

EXPERIENCE OF THE SHCHEKINSKY CHEMICAL PLANT IN THE SANITATION OF THE ATMOSPHERE. *(Opyt raboty Shchekinskogo khimicheskogo kombinata po ozdorovleniyu atmosfernogo vozdukha). Text in Russian. Gigiena i Sanit., 37(2):96-97, 1972.*

Experiences of the last 5 years in the sanitation of the atmosphere at the Shchekinsk chemical plant are described. After an inventory of the air pollutants emitted from different shops of the chemical plant was established, a special sanitary service for controlling shops and pollution control equipment, as well as for elaborating measures for pollution abatement was organized. In addition, strict technological discipline was implemented. Pollution reports were submitted daily on the basis of round-the-clock analyzes of samples taken in shops and at definite distances from the plant. Microconcentrations of 14 different toxic substances were systematically measured, and a chromatographic determination was applied to organic pollutants. The number of analyzes totaled some 20,000 yearly, and a total of 142 measurements were taken during the

5 year period (procedures for the absorption of ammonia, sulfur dioxide absorption by oleum, and technological improvements in caprolactam waste incineration, for example). The sulfur dioxide and ammonia concentrations decreased by 93% and 90-92%, respectively, as a result of the above measures. The individual concentrations and the total concentration of pollutants such as sulfur dioxide, ammonia, and nitrogen oxides around the plant were far below the maximum allowable values.

21459 APTIC NO. 40035

Kurita, Hidemi, Yoshihiko Kitamura, Hideo Akao, Setsuji Nishizawa, Michiro Matsuyama, Kaoru Miyajima, Minoru Kawamura, Yukio Maki, Masato Maruyama, Hisato Seki, and Gentaro Yamaura

INVESTIGATION ON AIR POLLUTION IN NAGANO PREFECTURE. PART 5. POLLUTION BY AUTOMOBILE EXHAUST GASES AT AND AROUND THE BUSY STREET IN NAGANO PREFECTURE. *(Nagano ken no taikiosen chosa dai 5 ho: Kenka shuyo doro oyobi sono shuhen ni okeru jidosha haikigasu osen (Showa 45-nen)). Text in Japanese. Nagano Prefectural Inst. of Public Health and Nuisance (Japan), 102p., March 1972. 1 ref.*

Concentrations of carbon monoxide, nitrogen oxides, sulfur dioxide, and suspended particulate matter, traffic volume, and meteorological conditions were measured at 12 spots on the street or at intersections in Nagano Prefecture. Concentrations of CO, NOx, and suspended particulate matter were higher at the road side than at spots away from the street, but SO2 was no different. Average concentrations of CO, nitrogen oxides, nitric oxide, nitrogen dioxide, SO2, and suspended particulate matter at the main street sides were 8.4 ppm, 0.095 ppm, 0.063 ppm, 0.033 ppm, 0.023 ppm, and 0.94 mg/cu m, respectively. Traffic volume was 300 1000/hr. A relation between the traffic volume and concentrations of air pollutants was not found. Geographical features and climatic conditions more strongly affected air pollution than traffic volume. The effect of traffic was only found within 50 m of the main street and concentrations of pollutants decreased in inverse proportion to the distance. Levels of CO and NOx decreased with the increase of distance away from the street and height from the ground, but SO2 concentrations did not decrease with the increase of height from the ground.

21460 APTIC NO. 40507

Kurita, Hidemi

INVESTIGATION OF AIR POLLUTION IN NAGANO PREFECTURE. PART 4. MEASUREMENT RESULTS OF SULFUR DIOXIDE CONCENTRATION BY ROSANILINE-FORMALIN METHOD. *(Chosa kenkyu hokoku dai 96-go. Nagano-ken no taiiosen chosa dai 4-po. Rozanirin-horumarin-ho ni yoru aryusan gasu sokutei kekka (Showa 45-nen)). Text in Japanese. Nagano-ken Eisei Kogai Kenkyusho Chosa Kenkyu Hokoku (Bull. Nagano Prefect. Inst. Public Health Public Nuisance), no. 96:1-34, July 1971.*

Sulfur dioxide concentrations were measured for 5 days from June 1970 through March of 1971 at 74 sampling sites in 29 cities, towns, and villages of Nagano Prefecture. In Nagano and Matsumoto Cities, measurement was made for every 5 days in summer and winter. The maximum mean concentration for a day among all the sampling sites was 0.052 ppm and the minimum value was 0.000 ppm. The mean of the mean values for 5 days at all sampling sites was 0.008 ppm; standard deviation, 0.003 ppm; median 0.005 ppm; mode, 0.003 ppm; the maximum value, 0.029; the minimum value, 0.000 ppm; and the sulfur dioxide concentration tended to be high in the center of urban districts. In comparison with the mean concentration according to the districts, correlation between human activities and SO2 concentrations was not clear. A significant difference was not recognized between sulfur dioxide concentrations of summer and those of winter at Nagano and Matsumoto Cities. Value of n was calculated from the maximum mean concentration for a day and that for 5 days at every sampling site, on the assumption that the minimum mean concentration for 1 hour is in proportion to -1/n power of measurement time. By using this n value, the mean value according to districts was supposed to be 0.02-0.04 ppm, and the maximum concentration in a district was supposed to be 0.03-0.09 ppm.

21461 APTIC NO. 40508

Kurita, Hidemi, Masato Maruyama, and Kaoru Miyajima

INVESTIGATION ON AIR POLLUTION IN NAGANO PREFECTURE. PART 2. DUST FALL IN NAGANO PREFECTURE. (1969). *(Nagano-ken no taikiosen chosa dai 2-ho. Nagano-ken no kokabaijin (Showa 44-nen)) Text in Japanese. Nagano-ken Eisei Kogai Kenkyusho Chosa Kenkyu Hokoku (Bull. Nagano Prefect. Inst. Public Health Public Nuisance), no. 93:1-54, July 1971.*

For 2 years, measurements of air pollution in Nagano Prefecture were carried out. The mean amount of dust fall was 5.56 g/sq m/mo, which was slightly increased over 1967 and 1968. The amount and pH of dust fall in different places of measurement showed logarithmic normal distribution. The monthly mean amount of dust fall was less in December and January compared with that of other months. The amount of soluble components in the dust fall were strongly related to precipitation. The relation between the amount of dust fall and height was also investigated, since previous measurements and insoluble soluble and unsoluble ignition loss decreased with the increase of height from the ground. Percentages of soluble and unsoluble components to the total amount of dust fall were shown in tables by different points of measurement and by different month.

21462 APTIC NO. 40293

Los, L. I, A. G. Sakovnikova, R. M. Soboleva, and D. Ya. Turets

THE ACTION OF A PETROLEUM PROCESSING PLANT ON THE QUALITY OF THE ENVIRONMENTAL AIR. *(Vliyaniye neftepererabatyvayushchego zavoda n kachestvo atmosfernogo vozdukha). Text in Russian. Gigiena i Sanit., vol. 8:8-13, 1950.*

Hydrocarbons and hydrogen sulfide were determined in air samples taken at 6-8 m above the ground level from the central, north, south, east, and west portion of a petroleum processing plant and from settlements located within a radius of 2,650 m. Of the 18 samples taken at each site, 15 samples contained hydrocarbons ranging from 0.02 to 1.16 mg/l north, 14 samples contained 0.03 to 1.07 mg/l south, 14 samples had 0.02 to 0.27 mg/l east, and 17 samples had 0.02-0.61 mg/l west from the industrial plant. Hydrogen sulfide was present in most of the samples taken from the central portion of the industrial area, in six samples from the western portion, and in three samples from the eastern portion of the considered area. Tests performed up to 32 m altitude showed that HC concentrations decreased above 21 m altitude. Average HC concentrations were 0.11 mg/l from 6.0 to 13.0 m, and varied from 0.02 to 0.04 mg/l at 23, 25, and 32 m altitudes. Amounts of 0.001- 0.002 mg/l H2S were found only up to 13 m altitudes. Hydrocarbons ranging from 0.17 to 0.36 mg/l were found in samples taken at 1.5 12 m levels in settlements located at less than 2.5 km from the industrial plant, under southern wind conditions. Amounts ranged from 0.02 to 0.75 mg/l in 22 out of 29 samples taken from dwelling areas located at less than 1 km southeast and southwest from the industrial plant. Considerable amounts of hydrocarbons and H2S were found within the work shops in air samples taken under open door or under ventilation conditions. These findings were attributed to defective sealing of the equipment and to the air supplied by ventilation from outdoors. Hydrocarbons were determined by combustion and measurement of the generated carbon dioxide expressed in carbon. Hydrogen sulfide was determined by spot tests on lead acetate-treated filter paper strips or by means of silver nitrate reaction technique.

21463 APTIC NO. 40036

Mamuro, Tetsuo, Yatsuka Matsuda, and Akira Mizohata

IDENTIFICATION OF AN AIR POLLUTION SOURCE BY INSTRUMENTAL NEUTRON ACTIVATION ANALYSIS. *(Kiki bunseki teki hoshaka bunseki ni yoru taiki osengen no chosa). Text in Japanese. Radioisotop. (Tokyo), 21(3):183-185, March 1972. 5 refs.*

Dermatitis inducing substances which were released from some factories were examined by the use of a gamma spectrometer connected with a Ge semiconductor and a multichannel wave analyzer. Suspended particulate matter was collected at four points in the area of the factories and at two points in the control areas for 2 years. Analysis of 26 elements was done by gamma-ray spectrometer. The concentration of selenium at one point was 0.398 micrograms/cu m which was 100 times higher than that of the control area, 0.0041 micrograms/cu m. From 5 months before the experimental period, occurrence of dermatitis was not observed. The standard value of hydrogen selenide in the boundary line of the factories was 18 micrograms/cu m (0.005 ppm)/30 min. Sodium, potassium, iron, arsenic, zinc, chromium, cobalt, nickel, and other elements were also measured.

21464 APTIC NO. 40626

Mueller, P. K., R. W. Mosley, and L. B. Pierce

CHEMICAL COMPOSITION OF PASADENA AEROSOL BY PARTICLE SIZE AND TIME OF DAY. IV. CARBONATE AND NONCARBONATE CARBON CONTENT. *J. Colloid Interface Sci., 39(1):235-239, April 1972. 14 refs.*

An aerosol study, conducted during photochemical smog episodes in Pasadena, California (August and September, 1969), indicated that carbon in particulate matter measured as a function of size and time of day may be a useful indicator of aerosol origin. Three sets of cascade impactor samples were analyzed for carbonate and noncarbonate carbon. Two sets were obtained during 4 hours in the afternoon and one set during 11 hours in the daytime. A method was developed for measuring 10 micrograms or more of carbon in size-segregated collections. The findings of the study were consistent with the expectation that a substantial fraction of the photochemically formed aerosol results from conversion of volatile organics. Atmospheric carbon particulate matter takes the form of the element, organic compounds, and carbonates. The carbonate carbon was consistently less than 1.0 micrograms/cu m, whereas the noncarbonate carbon ranging from 20 to 35 micrograms/cu m constituted from 18 to 44% of the total particulate matter.

21465 APTIC NO. 40019

Ogata, Masana, and Sumiko Hayashi

CORRELATION BETWEEN THE CONCENTRATION OF SULFUR OXIDES BY PBO2 AND NITROGEN OXIDES IN MIZUSHIMA INDUSTRIAL AREA. *(Mizushima chiku ni okeru io sankabutsu to chisso sankabutsu no sokan ni tsuite). Text in Japanese. Nippon Koshu Eisei Zasshi (Japan. J. Public Health), 19(3):121-126, March 1972. 16 refs.*

The concentrations of sulfur oxides and nitrogen oxides in the Muzushima industrial area of Okayama Prefecture were examined by the lead oxide method and alkali filter paper method, respectively. A good correlation between the two was established, with the correlation coefficients within 0.64-0.97 in the period 1966-1970. The NOx-SOx ratio was higher in the fall-winter time than in the spring-summer time. Since the alkali filter paper method was mainly testing the nitrogen dioxide in the NOx mixture, and the rate of NO2 formation at lower temperatures was higher than that at high temperatures, the temperature difference of the two periods of time might be one of the reasons for the difference in ratios.

21466 APTIC NO. 40265

Petrilli, F. L. and S. Kanitz

PUBLIC HEALTH PROBLEMS DUE TO AUTOMOTIVE TRAFFIC AND RESULTANT AIR POLLUTION. *(Problemes de sante publique qui se posent a la suite du trafic motorise et de la pollution de l air qui en resulte). Text in French. Giorn. Igiene Med. Prevent. (Genoa), 11(4):215-235, Oct./Dec. 1970. 8 refs. (Presented at the International Union of Air Pollution Prevention Associations, International Clean Air Congress, 2nd, Washington, D. C., Dec. 6-11, 1970.)*

The problem of pollution by automobile engine exhaust was investigated with special reference to the degree of pollution on highways where tunnels follow close to one another, and to the effect of the tunnels on pollutant levels inside passenger cars. The following indices were considered: rate of pollutant production in tunnels (e.g., carbon monoxide, nitrogen oxides, hydrocarbons); CO level in passenger compartments; carboxyhemglobin of driver or passenger blood; and the reactivity of subjects experimentally exposed to known concentrations of CO. The rate of pollutant production in one-way tunnels was steady and pollutant concentrations followed a constant course according to distance from ground level. Pollutant levels inside cars were significantly related to the degree of outer air pollution and influenced by tobacco smoke, as were blood carboxyhemoglobin levels. Ventilation of highway tunnels, therefore, appears to be indispensible whenever their length exceeds 1250 m and they are numerous and close together. Present ventilation devices on European cars are inadequate to control the degree of air pollution in passenger compartments.

21467 APTIC NO. 40052

Prietsch W. and H. Berchner

EVALUATION OF EMISSION MEASUREMENT RESULTS WITH THE AID OF AN ELECTRONIC COMPUTER. *(Auswertung von Immissionsmessergebnissen mit Hilfe eines elektronischen Kleinrechners). Text in German. Z. Ges. Hyg. Ihre Grenzgebiete (Berlin), 18(4):238-243, April 1972. 15 refs.*

For an evaluation of emission measurement results, the individual data are first classified according to their concentration. The relative frequency distribution, the relative sum frequency, the 50% value of the sum frequency, the 95% value of the sum frequency, and the excess frequency of upper limits for individual ranges are determined and some peak values are exposed. The 50% value of the relative sum frequency is a measure for the average concentration of the measured short-term values, the 95% value is viewed as peak concentration. In order to take the traffic density into account, the measured values are grouped into daytime values (6 a.m. to 10 p.m.), nighttime values (10 p.m. to 6 a.m.), and into the values over a whole day (6 a.m. to 6 a.m.). For comparison with the long-term maximum allowable emission concentrations, the diurnal average must be known (calculation of the arithmetic mean from the 48 half-hour values of one day). Moreover, the relative frequency distribution and sum frequency must be determined by means of the 50% or 95% values of the measured or calculated 24-hour values. The obtained data can be evaluated by means of electronic computers. The computer can be used for the calculation of the concentrations from the extinction. The computer program necessary for this purpose is roughly outlined.

21468 APTIC NO. 39809

Rossano, August T., Jr.

THE JOINT CITY, COUNTY, STATE AND FEDERAL STUDY OF AIR POLLUTION IN LOUISVILLE. *J. Air Pollution Control Assoc., 6(3):176-181, Nov. 1956. (Presented at the Air Pollution Control Association, Annual Meeting, 49th, Buffalo, N. Y., May 20-24, 1956.)*

The major objectives of a study of the air pollution problems in the West End section of Louisville, Ky., near a rubber-producing industrial area, are to determine both the air quality in the area and the relationship between air quality and meteorologic and micrometeorologic factors. The air sampling network is laid out in concentric arcs 2 and 3 1/2 mi from Rubbertown as the center. Conventional high volume samplers with glass fiber filters are used, and the particulate samples collected are analyzed for total loading and organic and inorganic fractions. Chlorides, sulfates, and nitrates are determined by wet chemical methods. Specific gases are sampled by scrubbers, absorbers, impingers, and evacuated flasks. Continuous gas sampling is limited to a sulfur dioxide recorder. The meteorologic network is described. Additional phases of the study include an inventory of the air pollution sources and a survey of the nature and origin of objectionable odors in the West End. The trained observer program, data reduction, and public relations are discussed.

21469 APTIC NO. 40011

Schwegler, H.

DISCUSSION CONTRIBUTION NO. 7. *(Diskussionsbeitrag Nr. 7). Text in German. Staub, Reinhaltung Luft, 32(2):84-85, Feb. 1972.*

Measurements of carbon monoxide concentrations at 31 measuring stations in Munich, West Germany, from 1967 to 1970 showed a rapid increase of the concentrations. Since no distinct yearly variations were determined, the influence of automobile exhausts was prevalent (77% of all concentrations in places with minimum traffic was below 10 ppm, while the corresponding percentage for places with high traffic density was 6). The carbon monoxide concentrations were practically not influenced by the wind velocity. Maximum average concentrations and highest peaks were found on the outskirts, and rising trends in the center city were revealed first during the period of 1970-1971.

21470 APTIC NO. 40141

Seki, Toshihiko, Hidehiko Hoshikawa, Morio Suzuki, and Tadashi Sugano

AIR POLLUTION BY AUTOMOBILE EXHAUST GASES AT THE STREET IN SENDAI CITY (PART 4). *(Sendai shinai ni okeru jidosha haikigasu ni yoru gairo jo no taikiosen ni tsuite (dai 4 ho)). Text in Japanese. Sendai-shi Eisei Kenkyusho Ho (Proc. Inst. Pub. Health, Sendai City), no. 2:201-209, 1971.*

The actual conditions of air pollution by automobile exhaust gases were studied at the intersection of Itutubashi in Sendai City. The survey was carried out from 7 am to 7 pm on June 24th, 1968. The number of passing automobiles, the amount of carbon monoxide and nitrogen dioxide, and the quantity of suspended dust (airborne dust) were measured. Passing automobiles totaled 43,644, with a maximum of 4146 at 6 am and a minimum of 1218 at 7 am. The noises ranged from 63 to 94 phons, with a medium value of 71 to 78 phons. The NO2 ranged from 0.02 to 0.07 ppm (an average value of 0.034 ppm). The amount of suspended dust equaled 0.941 mg/cu m, with an average value of 0.941 at 0 to 3 pm, and 0.748 mg/cu m at 4 to 7 pm. The CO was 2.0 to 35.0 ppm (an average of 10.1 ppm). Carbon monoxide increased at 8 to 11 am and 2 to 6 pm, when many automobiles passed by.

21471 APTIC NO. 40142

Seki, Toshihiko, Hidehiko Hoshikawa, Morio Suzuki, and Tadashi Sugano

AIR POLLUTION BY AUTOMOBILE EXHAUST GASES AT THE STREET IN SENDAI CITY (PART 5). *(Sendai shinai ni okeru jidosha haikigasu ni yoru gairo jo no taikiosen ni tsuite (dai 5 ho)). Text in Japanese. Sendai-shi Eisei Kenkyusho Ho (Proc. Inst. Pub. Health, Sendai City), no. 2:210-216, 1971.*

Air pollution including carbon monoxide and nitrogen dioxide were measured at the intersection of Aoba Street, which was located in front of Sendai Station. The survey was carried out from 7 am to 7 pm on June 28th, 1968. The number of passing automobiles, weather conditions, noise, and the amounts of suspended dust (airborne dust), NO2, and CO were measured. Passing automobiles totaled 57,900, with a maximum of 5520 at 6 pm and a minimum of 1818 at 7 pm. The noise was 63 to 91 phons and the hourly medium value was 70 to 76 phons. The NO2 concentration ranged from 0.012 to 0.038 ppm (an average of 0.022 ppm) and the peak was reached at 8 to 10 am. The amount of suspended dust was 2.21 mg/cu m at 7 to 10 am, 0.96 mg/cu m at 0 to 3 pm, and 1.67 mg/cu m at 4 to 7 pm. The CO concentration was 0 to 28 ppm (an average of 8.7 ppm). The correlation between the amount of CO and the number of passing automobiles on the street was equals 0.78, and a regression equation was obtained.

21472 APTIC NO. 40731

Seki, Toshihiko, Hidehiko Hoshikawa, and Tadashi Kanno

RESEARCH ON THE AIR POLLUTION PART 6: ON SO2 CONCENTRATION IN THE ATMOSPHERE DETERMINED BY AN AUTOMATIC RECORDER IN SENDAI CITY FOR THE PAST TWO YEARS. *(Taikiosen ni kansuru chosa kenkyu dai 6-ho: Jidokirokukei ni yoru kako 2-nenkan no Sendai-shinai ni okeru taikichu SO2 nodo ni tsuite). Text in Japanese. Sendai-shi Eisei Kenkyusho Ho (Proc. Inst Pub. Health, Sendai City), no. 2:119-156, 1971. 5 refs.*

The determination of sulfur dioxide in the atmosphere has been made by the method of electroconductivity at two spots: in front of the Sendai Station (an area of much air pollution) and at the Public Health Experiment Station of Sendai City (a residential area). The maximum SO2 concentrations were 2.10 ppm in front of the Sendai Station in Nov. 1968 and 0.16 ppm in the residential area in Feb. 1969. Both of them occured at 8 am during winter, with isotherm and inversion layers, and with calm wind velocity of 2 m/sec. The yearly mean values of SO2 were 0.034 ppm in front of Sendai Station and 0.023 ppm at the Experimental Station. The maximum hourly mean value was from 8-9 am and from 16-18 pm. The daily minimum SO2 concentration was recorded from 3-5 am. The monthly frequency of SO2 concentrations of 0.05 ppm or more during heating months was 40%; it decreased by 1/20 during non heating months indicating only 2% of that during heating months. In a comparison of daily mean levels between weekdays and Sundays, suspension of operating boilers for heating in each industrial establishment resulted in a decrease of 12% on Sundays (0.022 ppm) compared to weekdays (0.025 ppm) and a 36% decrease in the winter. The SO2 concentration in the Sendai City was not exceeding the environmental standard. It exceeded the Miyagi Prefecture Regulations for Environmental Pollution Control which had a standard for daily average concentration of 0.05 ppm and of maximum concentration for a short time of 0.1 ppm once a day.

21473 APTIC NO. 40128

Steinhauser, Ferdinand

INVESTIGATIONS ON THE SO2-DEPOSITS AND ON THE SO2-CONTENTS OF THE AIR IN VIENNA. *(Untersuchungen ueber die SO2-Ablagerungen und den SO2-Gehalt der Luft in Wien). Text in German. Arch. Meteorol. Geophys. Bioclimatol., Ser. B, vol. 18:383-395, 1970. 5 refs.*

Annual and long-term variations of sulfur dioxide deposition measured over the last 12 years in Vienna by means of the Bamberger-Nussbaum-Liesegang rag method are described, and the results are compared with data obtained from simultaneous measurements of the SO2 concentrations in the air by means of the Hartmann-Braun Picoflux gas tracer. The SO2 deposits for 28-day periods, showing large yearly variations, were strongly influenced primarily by temperature conditions, wind directions, and inversions. Maximum values in January and minima in the period from mid-July to mid-August were observed, the maximum to minimum ratio being 12:1. The variations in summer and fall were less than in winter, and high values for severe winters were found. Thus, both domestic heating and high frequencies of day-long low inversions and certain wind directions were chiefly responsible for high SO2 concentrations. The temperature deviations in winters with SO2 deposits below normal were positive. The 28-day averages calculated from 30-minute means of concentration measurements showed annual variations similar to those of the deposits. The functional relation of the values obtained by the two different methods, though not linear, permits the approximative determination of 28-day concentration averages from the rag data. Thus, the rag method is suitable not only for determination of the field distribution of averages, but also for the approximation of long-period variations in the average concentrations, especially for high values.

21474 APTIC NO. 40075

Tabor, Elbert C. and William V. Warren

DISTRIBUTION OF CERTAIN METALS IN THE ATMOSPHERE OF SOME AMERICAN CITIES. *A.M.A. Arch. Ind. Health, vol. 17:145-151, Feb. 1958. 9 refs. (Presented at the American Industrial Hygiene Association, St. Louis, Mo., April 25, 1957.)*

Concentrations of 17 metals in the atmospheres of 20 communities are reported. Except for antimony, beryllium, cobalt, and molybdenum, these metals were widely distributed, with detectable amounts found in particulate samples from most of the communities. Data for iron, copper, lead, manganese, and zinc were of such a nature that they were suitable for statistical evaluation, while data for the other metals were unsuitable for such an analysis because a large percentage of samples contained less than the minimum detectable amount of the metals. The need is thereby demonstrated for development of analytical methods of greater sensitivity or collection of larger samples that permit present analytical methods to yield measurable values. Considerable variation in the maximum levels found among the various communities was observed. Most of the high maxima were associated with the more heavily industrialized communities. (Author summary modified)

21475 APTIC NO. 40716

Tatsumi, Syuzo and Hiroshi Ishihara

THE POLLUTED MATERIALS IN THE STREET TREE LEAVES. *(Gairo juyobu ni fuchaku suru osen busshitsu ni tsuite). Text in Japanese. Taiki Osen Kenkyu (J. Japan Soc. Air Pollution), 6(1):156, 1971. (Presented at the National Council Meeting of Air Pollution Studies, 12th, Nagoya, Japan, Oct. 27-29, 1971.)*

The amount of particulates falling on the main street of Takamatsu city was measured at five locations close to the camphor trees area with 1-meter dust collectors. The particulates were separated as tar substances, combustible substances, and ash, and lead content in tar and ash was investigated. The amount of particulates was dependent on season and maximum traffic at intersection. The maximum total particulates was 140 tons/sq km/mo; tar substance was 1-6 tons; and lead content was 2-40 grams. Particulates sticking on leaves of the trees were also collected and analyzed. Lead content in tar substance of particulates on the tree leaves was studied by comparing with commercial gasoline using gas chromatography. A 2-meter column packed with 40% nujol/chromosorb was used for the analysis. A substance corresponding to tetraethyl lead was found in the tar substances.

21476 APTIC NO. 40584

Wells, A. E.

INVESTIGATIONS TO DETERMINE THE EXTENT OF THE CONTAMINATIONS OF THE ATMOSPHERE IN THE SELBY SMOKE ZONE BY THE SMELTER EMANATIONS. *Bull. Bureau Mines, no. 98: 82-212,503-520, 1915. 86 refs.*

A portable laboratory was used to determine sulfur dioxide concentrations and total sulfur in urban and agricultural areas inside and outside the Selby smoke zone. Additional SO2 determinations in the zone were made under various wind conditions, under the most unfavorable wind and smoke conditions, at different time periods, and at times when Selby smoke was smelled or supposed to have been smelled. Analyses were also made for lead and arsenic on soil and grasses in the smoke zone. Of the 4862 instaneous air samples taken in the smoke zone during Sept., Oct., and Nov. 1913 and March, April, and May 1914, 75.5% contained less than 0.2 ppm SO2, 86.26% less than 0.4 ppm, and 97.46% less than 1.0 ppm. Only 21 samples, or 0.43%, contained more than two parts SO2 and no sample analyzed contained more than 7.1 ppm SO2. Concentrations were highest when west winds blew smelter smoke over the smoke zone. Daily peaks were observed at noon or in the early afternoon. Under moderate or brisk wind conditions, a maximum of 1.25 ppm SO2 was found when the smelter emitted 70 tons SO2/day. Even under the worst wind conditions and with plant output of 90 tons SO2/day, the maximum concentration in Benicia was only 2.40 ppm. Thus Selby smoke does not constitute a menace to the successful growing of crops in the smoke zone.

ATMOSPHERIC INTERACTION

21477 APTIC NO. 39906

TRW Systems Group, Redondo Beach, Calif.

AIR QUALITY IMPLEMENTATION PLAN FOR THE STATE OF ALASKA. VOLUME I: CONTROL STRATEGY APPENDICES. *Office of Air Programs Contract 68-02-0048, Rept. APTD-0970, 125p., Dec. 1971.*

NTIS: PB 208336

Supportive data and calculations for the control measures are presented. Appendices include: estimation of air quality caused by particulate emission in Anchorage; variations in particulate concentrations with wind, rain, and temperature; seasonal variations in particulate concentrations in Anchorage; description of Anchorage road surfaces; cost of paving and maintaining; estimation of air quality due to particulates and carbon monoxide in Fairbanks; motor vehicle emissions in Fairbanks; estimation of the reduction in carbon monoxide automobile emissions; emissions from fuel combustion; description of rejected control measures; estimate of carbon monoxide reduction due to automatic signal control; and estimates of ground level concentration of sulfur oxides, CO, and particulates.

21478 APTIC NO. 40136

Air Weather Service, Scott AFB, Ill.

ENVIRONMENTAL-MEASURING EQUIPMENT USED BY AIR WEATHER SERVICE IN SUPPORT OF AIR FORCE AND ARMY OPERATINGS. *AWSP 105-3, 247p., July 30, 1971.*

NTIS: AD 731165

Standardized environment measuring equipment used by the Air Weather Service is examined with respect to official designation, operating principle, applicability, manufacturer, unit cost, accuracy, and efficiency. The categories consist of fixed-installation equipment, tactical mobile equipment, and tactical portable equipment and include ceilometers, clinometers, ceiling light projectors, and ceiling balloons for determinations of cloud ceilings; transmissometers, computers, and visual range systems for visibility measuring; wind measuring equipment: barometers, barographs, and altimeter-pressure systems for pressure determinations; temperature and humidity measuring equipment, including thermometers; precipitation measuring systems; radars; storm detectors; meteorological stations; radiosondes; meteorological balloons; probes, rocket sounding systems; and space-environmental observing equipment.

21479 APTIC NO. 40140

Takaishi Municipal Office (Japan), Section of Public Nuisance

REPORT OF INVESTIGATION ON AIR POLLUTION IN TAKAISHI CITY. *(Takaishi-shi Taikiosen chosa Hokokusho. Showa 46-nen 8-gatsu). Text in Japanese. 148p., Aug. 1971.*

Meteorological conditions were measured in two places, and the average wind speed and wind direction were shown in tables and figures by different places and months. Concentrations of sulfur oxides were measured by an electric conductivity method at three places. The annual mean concentration was not over the 0.05 ppm air quality standard. The average level of sulfur trioxide measured by the lead dioxide method was 1.26 mg/day/100 sq m. Comparatively high concentrations of SOx occurred with north-west winds under 2 m/sec. The monthly average concentration was higher during October through March, and a peak was seen between 8:00-20:00. Levels of suspended particulate matter have been decreasing each year. On the contrary, dust fall has been increasing and is now 8.26 ton/mo/k sq m. However, insoluble solids are decreasing. Levels of suspended particulate matter were high when the daily mean wind velocity was 1-2 m/sec, and two peaks were found per day. Consumption of fuel oil was also investigated. The amount increased 1-2 times over that of the previous year. Stability was also mentioned.

21480 APTIC NO. 40681

Aleksandrov, E. L. and N. V. Klepikova

DEFORMATION OF CONDENSATION NUCLEI SPECTRA UNDER IRRIGATION CONDITIONS AND EVALUATION OF ITS EFFECT ON THE VISIBILITY. *(Deformatsiya spektra yader kondensatsii pri obvodnenii i otsenka eye vliyaniya na vidimost). Text in Russian. Tr. Inst. Eksp. Meteorol., no. 20:84-94, 1971. 13 refs.*

Deformations of condensation nuclei spectra as a function of increased humidity in a range of 80-100% were calculated, and the effects of droplet growth on visibility were evaluated. A formula of the equilibrium condition of water drops on partly soluble condensation nuclei is given. The dry nuclei may be coated by very thin membranes of a saturated solution. The sum distribution of condensation nuclei and the particle size distribution of the water-soluble substance can be described by the same function. Deformations of condensation nuclei spectra in a range of 0.1-10 micron are presented. The spectral deformations for humidities below 100% are located between the deformation for 100% humidity and the distribution of dry condensation nuclei. The solvent droplets below 100% humidity are in equilibrium, while the nuclei, containing unsoluble substance, are in an unstable state. Increasing droplet radii result in reduced vapor pressure with solution concentration unaltered, which enhances further growth. Minimum radii of condensation nuclei forming droplets at various humidity concentrations, as well as radii of the formed droplets as a function of the soluble content, are calculated. The step factor of the Junge distribution for the spectral deformation (-3 to -4) is dependent on the size of the formed droplets. Attenuation factors in haze for different soluble concentrations and a dry nuclei concentration of 1 microgram/cu m are determined. Variations in the attenuation factor are directly proportional to the nuclei concentration variation in a range of 0.001-0.000005 cm. The scattering factor may be assumed to be two for calculations of the light attenuation. 0

21481 APTIC NO. 40690

Aleksandrov, E. L. and N. P. Yasevich

PRELIMINARY EXPERIMENTS ON THE ACTION OF CONDENSATION NUCLEI UPON FOG PRODUCED IN CHAMBERS. *(Rezul taty predvaritel nykh opytov po vozdeystviyu na tuman v kamere yadrami kondensatsii). Text in Russian. Tr. Inst. Eksp. Meteorol., no. 20:44-51, 1971. 10 refs.*

Results of preliminary experiments on fog modification by means of condensation nuclei are described. The air in the chamber was maintained under a pressure of 1.3 atm over 2 hr, and following the introduction of ammonium chloride particles as condensation nuclei in concentrations of 0.01, 0.1, 0.2, and 1 mg/cu m, expansion was made at a constant cooling rate over 1.5-2 hours. The initial temperature was in a range of 17.5-20.1 C. Drop concentration, size distribution spectrum mean diameter, water content, and visibility were measured. Condensation nuclei, introduced in concentrations exceeding 0.1 mg/cu m, considerably affected the concentration, the size of fog droplets, and the visibility. The root-mean-cube diameter of the fog drops reached its maximum after 40-50 min with values of 13.0 and 11.3 micron for concentrations of 0.1 and 1 mg/cu m, respectively, compared with 16.8 micron in fogs without condensation nuclei. Reduced visibility with concentrations from 0.10 to 0.1 mg/cu m increased considerably the stability of the fog. The results obtained are in good accordance with theoretical considerations.

21482 APTIC NO. 40271

Bartels, Otto G.

AN ESTIMATE OF VOLCANIC CONTRIBUTIONS TO THE ATMOSPHERE AND VOLCANIC GASES AND SUBLIMATES AS THE SOURCE OF THE RADIOISOTOPES BE(10), S(35), P(32) AND NA(22). *Health Phys., 22(4):387-392, April 1972. 30 refs.*

Utilizing new data on the presence of a sulfate aerosol layer in the stratosphere, an analysis is made of the source of excess sulfate in precipitation. Data are presented against the hypothesis of appreciable escape to the atmosphere of hydrogen sulfide produced on the continental shelves. Calculated volcanic contributions to the atmosphere in metric tons/yr are chlorine-7.6 million, sulfur-17 million, fluorine-7.3 million, boron-73,000, sodium-6 million, potassium-2.3 million, and calcium-7.2 million. The calculations support Conway's hypothesis of volcanic water and the volcanic chloride origin of the ocean. The points of weakness in the spallation hypothesis of atmospheric radioisotopes are presented. A table with the probable nuclear particle abundance at 16 km altitude is given. Calculations are made of the relative concentrations of boron, chlorine, sulfur, and fluorine in the upper atmosphere. The results almost parallel the abundance values in igneous rocks. Data on the probable altitudes where the nuclear ractions occur are presented including a new source for the sodium lines in the upper atmosphere air glow. (Author abstract)

21483 APTIC NO. 40678

Benarie, M. and T. Menard

VERIFICATION OF THE FORECAST OF HIGH ACID POLLUTION IN THE ROUEN REGION FOR THE WINTERS OF 1969-1970 AND 1970-1971. *(Verification, pour les hivers 1969-1970 et 1970-1971 de la prevision de la pollution par l acidite forte dans la region Rouennaise). Text in French. Atmos. Environ. 6(1):65-67, Jan. 1972. 2 refs.*

The high acid pollution during the winters of 1969-1970 and 1970- 1971 was in the Rouen region, as forecast by a simple, non mathematical method. Periods of at least one day with concentrations reaching or exceeding twice the mean concentration observed during the previous 30 days are termed high pollution. The forecast is based on the extrapolation of meteorological and pollution data for a previous period as well as estimations of the wind velocities. Seven out of 11 days of high pollution, distributed among five periods, were forecast correctly for the winter of 1969-1970, and six forecasts represented a dummy alarm. The wind velocity during three days of high concentration was 3.5 m/sec. Twelve of the 19 days with high pollution during the winter of 1970-1971, distributed among eight periods, were forecast correctly. Four out of five and six out of eight periods were forecast correctly for the winters of 1969-1970 and 1970-1971, respectively. The dispersion of the correct forecasts and that of the wrong forecasts were of the same order of magnitude (0.66).

21484 APTIC NO. 40687

Benarie, M., D. Badellon, T. Menard, and A. Nonat

USE OF MULTIPLE REGRESSIONS FOR DEFINITION OF BASIC LEVEL OF URBAN POLLUTION AND ITS SHORT-TERM FORECASTING. *(Emploi des regressions multiples pour la definition du niveau de fond de la pollution urbaine et pour sa prevision a court terme). Text in French. Pollut. Atmos., 14(53):29-41, Jan.-March 1972. 8 refs.*

The use of multiple regressions for the determination of the basic pollution level in the Rouen area, as well as general aspects of the method are described. Data obtained from systematic observations of high acid and smoke pollution at 10 stations, as well as meteorological data were used for the calculations. The variables applied for the calculation of the multiple linear regression equations separately for the winter and summer periods, were the season, wind speed and direction, mean temperature, absence or duration of fogs, precipitation, solar radiation, turbulence coefficient, and wind gradient. While the partial correlation factor for the wind vector was fairly high, those for the mean temperature, fog, precipitation, and sunshine durations, as well as temperature and wind gradients were both usually low and different, depending on the season. The representation of pollution data by multiple regression equations, and examples of calculations and observations for the Rouen area are described. The approximation was sufficient by using only four variables (season, wind direction, wind speed and mean temperatures), and the error for logarithmic and linear regression was the same. A forecast test gave a forecast-observation correlation factor of 0.64 at a significance level of 0.01. The method of the multiple regression equations can be applied for new emission sources, a posteriori forecasts, the detection of exceptional emissions, as well as for a priori forecasts, while days with high degree of wind variability as well as calms (arithmetic means from eight 3-hour wind speed readings are below 0.125 m/sec) are not covered.

21485 APTIC NO. 40164

Benini, Franco, Vincenzo Colamussi, Gianpietro Sivieri, and Giovanna Cervi

ENVIRONMENTAL CONCENTRATIONS AND ATMOSPHERIC DISPERSION OF ALKYL LEAD DURING THE GASOLINE ETHYLATION AND METHYLATION PROCEDURES. *(Concentrazione ambientale e dispersione atmosferica del piombo alchile, durante i procedimenti di etilazione e metilazione delle benzine). Text in Italian. Arcisp. S. Anna di Ferrara, 23(4/5):385-400, 1970. 42 refs.*

The concentration and dispersion of alkyl lead in petrol ethylation plants above and around the wagon which discharges ethyl fluid and in the atmosphere both close to and far from this plant were examined. A considerable part of organic lead vapors was absorbed and conveyed by the cooling wares. In the petrol ethylation process itself, there was little leakage, and none at all in petrol blends. Vapors with a high concentration were emitted during the intake of the contents of the wagons, none above and around them. Tetraethyl lead concentrations of up to 14 cu m were formed in the external atmosphere when there was heavy humidity, and organic lead compounds were determined even as far away as 70 m from the source. On dry sunny days there was no dispersion in the atmosphere, since the poison quickly disappears; triethyl lead probably turns into crystalline compounds. (Author summary modified) ½

21486 APTIC NO. 40195

Berg, Hellmut

OZONE IN THE LOWER ATMOSPHERIC LAYERS AND ITS METEOROLOGICAL IMPORTANCE. *(L ozone des couches basses de l atmosphere et son importance meteorologique). Text in French. Ann. Inst. Hydrol. Climatol., 26(79):55-71, 1955. 13 refs.*

Results of ozone measurements in the lower layers of the atmosphere are reviewed and hypotheses on the role of low-layer ozone in meteorologic phenomena are discussed. Investigations of the daily variations of ozone concentration revealed daytime maxima and night-time minima, although these patterns may not occur in mountains. Ozone concentrations appear to decrease before and during the passage of weather fronts, and to increase after such phenomena. Increased atmospheric instability accounted for high concentrations. Wind speed and temperature are principal factors determining both quantity and variations of atmospheric ozone. While most of the ozone in the lower layers probably originates in the upper layers of the stratosphere, the supply from the lower troposphere may be of secondary importance. While the ozone enters the lower layers of the atmosphere, it is partly used up in the formation of condensation nuclei and in various chemical reactions.

21487 APTIC NO. 40491

Berkofsky, Louis and Shoshana Gyoeri

A NUMERICAL MODEL FOR INVESTIGATION OF OZONE TRANSPORT IN THE ATMOSPHERE. *Air Force Cambridge Research Labs., Bedford, Mass., Meteorology Lab., Proj. 8604-10-01, DOD Element 61102F, DOD Subelement 681300, Rept. AFCRL-71-0367, ERP-358, 38p., June 24, 1971. 24 refs.*

NTIS: AD 731173

A zonally averaged model, including photochemistry, was devised to study the effects of transport by mean meridional motions and eddy diffusion upon the ozone concentration. The model contains 22 levels in the vertical from the ground to 66 km and 18 grid points, from pole to pole, in the horzontal. In order to test whether or not the model resembles the real atmosphere, the factors of advection, eddy diffusion, and turbulent heat transport from the surface of the earth were eliminated, and the model reproduced fairly closely the periodicity of the real atmosphere. Preliminary calculations including the turbulent heat transport yielded more satisfactory temperature values. Mean meridional motions affect transport of ozone from equatorial regions. However, calculations show that diffusion is probably the dominant process responsible for total ozone transport.

21488 APTIC NO. 39897

Berlyand, M. E.

ON HAZARDOUS CONDITIONS OF ATMOSPHERIC POLLUTION FROM INDUSTRIAL SOURCES. *Tr. Gl. Geofiz. Observ. (Leningrad), vol. 185:15-25, 1966 11 refs. Translation from Russian by B. F. Bulmer. 14p.*

The initial ascent of fumes released from chimneys, and its dependence on the coefficient of turbulent exchange and the atmospheric temperature gradient, are considered. Conditions are indicated in which the initial ascent may be small in the event of a temperature inversion. In cases where such conditions are accompanied by low wind speeds, particularly hazardous situations arise in which the surface concentration of the fumes reaches a maximum value.

21489 APTIC NO. 40627

Bitkolov, N. Z., Ye. M. Yegorov, I. I. Ivanov, and N. S. Tyunyakina

THE CHARACTER OF WIND SPEED VARIATIONS OCCURRING IN OPEN PITS. *(Kharakter izmeneniya skorosti vetra v karyerakh). Text in Russian. Tr. Gl. Geofiz. Observ. (Leningrad), no. 270:102-115, 1970. 7 refs.*

The influence of different factors on wind speed and direction variations occurring in open pit mines was studied. The character of air currents in open pits are determined both by pit profile and orographic factors. Wind speed distributions for smooth surfaces can be approximated by logarithmic functions. The correction factor applied for wind speed variations in open pits lies between 0.60 and 0.67. Assuming isothermal atmospheric conditions, the wind profile in open pits is determined by the character of the development conditions of soil-surface air currents, as well as by surface roughness. Increased recirculation with pit deepening can be observed. Convective currents are investigated as a function of the vertical temperature gradient. The speed of local currents in pits 100 to 150 m deep lies in a range of 2.0-2.5 m. The principal directions of local currents are determined on the basis of the solar energy distribution for morning, daytime, evening and night periods. The existence of temporary thermal currents is determined. As the character of the open pit winds is determined by the deformations of the surface wind due to specific geometric factors, and by local thermal currents, the resultant wind and both its speed and direction are a function of the above currents. While the relative wind speed is equal to that at the surface, the monthly averages are practically constant over the year, with slight increases in summer and fall. High amplitudes of speed variations as well as typical daily variations in summer due to both local currents and heterogeneity in temperature were determined. However, the effect of local currents at wind speeds above 5 m/sec is negligible. Increased depths result in reduced pit ventilation. Both intensity and regularity of local currents are determined, other conditions being equal, by the geographic situation and meteorologic conditions. The presence or absence of snow cover, the position of the sun, sunshine duration, and both pit profile and orientation are some of the general influencing factors.

21490 APTIC NO. 40661

Borisenko, M. M. and M. V. Zavarina

FEATURES OF THE WIND CONDITIONS OCCURRING IN THE LOWER ATMOSPHERIC LAYER ABOVE AN URBAN AREA. *(Osobennosti vetrovogo rezhima v nizhnem sloye atmosfery nad gorodom). Text in Russian. Tr. Gl. Geofiz. Observ. (Leningrad), no. 283:12-21, 1971. 8 refs.*

The effect of the urban character on the wind conditions was studied in the lower 200-meter layer of the atmosphere above cities and their environs. Variations of the maximum wind speed as a function of height above urban areas, differences between maximum wind speeds at 200 m above urban areas and their environs as well as vertical wind profiles at high wind speeds were calculated. Investigations of the wind profile as a function of the wind speeds measured in the lower (24-32 m) and upper levels (167-180 m) revealed that variations of the wind profile parameter in strong surface wind with nearly neutral stratification are primarily due to surface roughness. While the variations in the wind speed maxima as a function of height above urban areas were nearly linear, a slight increase in speed even in strong surface wind was observed. The wind profile parameter for maximum surface wind speed is two to four times that for maximum wind speed on the upper level of the 200-meter layer. The above parameter was 0.3 for highrise structures and 0.1 for slightly rugged urban areas. The maximum wind speeds 200 m above urban areas and their respective environs had differences of 4-5 m/sec, maximum. As strong winds on the upper level of the 200-meter layer mostly correspond to stable stratification with varying degrees of stability, the degree of roughness could not be characterized by the wind profile parameter.

21491 APTIC NO. 40269

Brook, R. R.

THE MEASUREMENT OF TURBULENCE IN A CITY ENVIRONMENT. *J. Appl. Meteorol., 11(3):443-450, April 1972. 32 refs.*

The structure of turbulence in a city environment was constructed from data collected at three heights on an 18.5 m tower in Melbourne, Australia, using anemometers to measure wind patterns, frequencies, and speed. The basic turbulence parameters were the frequency distribution of wind speed for each component, the intensity of turbulence, the surface drag coefficient, and the spectrum of turbulent energy. The turbulence was predominantly of mechanical origin and was, therefore, very much controlled by the terrain. Turbulence intensity decreased with height and was dependent on surface roughness. The spectra were best described in wavenumber space and scaled by variance.

21492 APTIC NO. 40778

Brown, Dale H. and Henry J. Sneck

COOLING TOWER PLUME RISE. *Proc. Am. Power Conf., vol. 33:546-553, 1971. 7 refs.*

From the parametric evaluation of plume rise with fixed initial conditions into a ground level atmospheric inversion, it is found that both zero buoyancy altitude and maximum rise altitude are greatest when the entire thermal exhaust is concentrated in a single plume and not subdivided into several plumes. The zero buoyancy plume rise is increased when the source has the greatest diameter and the least upward velocity. These plumes are modeled in an atmospheric research facility. The means of integrating the basic relations from calculations are a more direct engineering approach than the extended consideration of forced plumes in actual applications. Direct integration is mandated by the variation of atmospheric temperature gradient with altitude as well as condensation effects. (Author conclusions modified)

21493 APTIC NO. 40016

Burnett, Paul T.

TURBULENCE FORECASTING PROCEDURES. *Air Weather Service, Offutt AFB, Nebr., Air Force Global Weather Central, AFGWC-TM-70-7, 83p., Dec. 15, 1970. 18 refs.*

NTIS: AD 731134

The Air Force Global Weather Central operational procedures are described for the forecasting of low-level mechanical, mountain wave associated, and clear air turbulence significant to aircraft. These procedures involve both manual and automated diagnostic techniques for analyzing individual rawinsonde soundings, data at constant presure levels, and data from the AFGWC planetary boundary layer model. Brief outlines of computational procedures used in the computer diagnostic and prognostic programs are included. The basic forecast procedure is to associate reported turbulent and potentially turbulent areas with meteorological and orographic features, forecast the future positions of the meteorological features, and re-associate the turbulent areas. Forecasts of low-level mechanical turbulence rely to a considerable extent on prognoses of a numerical turbulence index. Index parameters are the gradient level wind, vertical motion, low-level atmospheric stability, 3-hourly sea-level pressure change, and terrain roughness. Formation of mountain waves is forecast using an automated adaptation of the Harrison technique, and considers sea-level pressure gradients and wind data above the mountain range. Clean air turbulence (CAT) is largely associated with shallow baroclinic layers of smaller scale than can be accurately forecast within the present state of the numerical weather prediction art. Consequently, automated forecasts of wind, vertical motion, and temperature distribution and empirical indices incorporating these parameters are assimilated by an experienced forecaster into the final prognosis. (Author abstract)

21494 APTIC NO. 40719

Bychkov, N. V., T. N. Gromova, and Yu. P. Sumin

ICE FORMING PROPERTIES OF COPPER SULFIDE UTILIZED AS A REAGENT FOR OVERCOOLED CLOUDS. *(L doobrazuyushchiye svoystva sernistoy medi kak reagenta dlya vozdeystviya na pereokhlazhdennye oblaka). Text in Russian. Tr. Gl. Geofiz. Observ. (Leningrad), no. 262:3-16, 1971. 11 refs.*

Results of artificial precipitation experiments with copper sulfide as ice-forming reagent on overcooled convection clouds are presented. The threshold temperature of this reagent lies at -3 C, while the activity is 1.2 trillion ice crystal per g at -10 C. The best method of introducing powdered copper sulfide into clouds is by means of reactive cartridges. The clouds investigated had vertical dimensions of 0.8-5.5 km with summit temperatures below -15 C. The cloud volumes were below 28 cu km. The reagent expenditures lay in a range of 7 to 400 g per cloud. Slight, intense, and complete dissipation, crystallization in the summit, and precipitation were the different phenomena observed after icing. Crystallization was observed at a minimum summit temperature of -6 C, and slight precipitation was obtained from clouds with vertical dimensions above 2.3 km. Clouds with vertical dimensions above 3.1 km and a minimum summit temperature of -9 C gave heavy rain. The lag between action and precipitation was about 12 min. A minimum reagent expenditure of 400 g was necessary for optimum effect. A high degree of overcooling required reduced vertical dimensions for maximum effect. Experiments on stratified clouds revealed crystallization at a minimum temperature of -7 C and a minimum expenditure of 400 g/km. Increased reagent expenditure was necessary for stabil crystallization in clouds with higher temperatures (-3 to -7 C).

21495 APTIC NO. 40056

Cadle, R. D.

FORMATION AND CHEMICAL REACTIONS OF ATMOSPHERIC PARTICLES. *J. Colloid Interface Sci., 39(1):25-31, April 1972. 29 refs.*

Particles may enter the atmosphere as a result of dust storms or industrial operations. They may also be formed by chemical reactions in the atmosphere and may be changed physically and chemically as a result of such reactions. The particles of photochemical smog are formed when nitrogen dioxide is photolyzed and the resulting atomic oxygen reacts with certain of the organic vapors present in such smog to trigger a series of complex reactions. There is considerable evidence that such reactions also occur in the ambient atmosphere involving essential oils emitted by vegetation. Hydrogen sulfide and sulfur dioxide are oxidized both in smog and in the ambient atmosphere by several different processes, the end products being sulfuric acid droplets and various sulfates. Sea salt particles are prevalent over the oceans and they undergo a number of chemical reactions including reactions with oxides of nitrogen and sulfuric acid droplets to liberate hydrogen chloride and produce nitrates and sulfates. Sulfuric acid droplets produced by the oxidation of H2S and SO2 react with atmospheric ammonia to form ammonium sulfate. (Author abstract)

21496 APTIC NO. 40469

Charlson, R. J., D. S. Covert, Yoshiro Tokiwa, and Peter K. Mueller

MULTIWAVELENGTH NEPHELOMETER MEASUREMENTS IN LOS ANGELES SMOG AEROSOL. III. COMPARISON TO LIGHT EXTINCTION BY NO2. *J. Colloid Interface Sci., 39(1):260-265, April 1972. 9 refs.*

A series of measurements in Los Angeles photochemical smog of the scattering component of extinction as a function of wavelength and of nitrogen dioxide (NO2) concentration permitted a comparison of the light extinction by aerosol scattering and by NO2 absorption. Results indicate that NO2 contributes significantly to the wavelength dependence of extinction in situations where the appropriate magnitudes of both aerosol and NO2 are present. During the period of record, NO2 had an effect about 20% of the time. Situations where NO2 was important cannot be typified by any particular level of NO2. No conclusion can be formed regarding a preferred time of day or night for this effect. Possibly, it is significant that high ratios (greater than or equal to 20) never occurred with high NO2 levels. Strictly speaking, these coloration results can be applied only to the case of light transmission through an unilluminated air mass, as through a tunnel. The real case of the atmosphere with varying angle and amount of illumination, varying brightness and contrast of objects viewed through haze, spatial variations of both pollutants and illumination, and so on, poses an important problem for future work.

21497 APTIC NO. 39855

Church, Phil E.

THE MICROMETEOROLOGICAL INSTALLATION OF THE UNIVERSITY OF WASHINGTON. *Interdepartmental Committee on Air Pollution, Washington, D. C., Air Pollut., Proc. U. S. Tech. Conf., Washington, D. C., 1950, p. 812-814. (May 3-5, Louis C. McCabe, ed.)*

On the University of Washington campus in Seattle, the Department of Meteorology and Climatology has installed a 45-meter tower, a 4-meter mast, and a heat well. When the planned instrumentation is completed, recorded data will be available for working on many problems of the transfer of heat, moisture, momentum, and turbidity in the lower 50 m of the atmosphere, the exchange of heat and moisture across the soil surface, and the diurnal, seasonal, and annual heat budget in the upper 15 m of the ground.

21498 APTIC NO. 40365

Cionco, Ronald M.

APPLICATION OF THE IDEAL CANOPY FLOW CONCEPT TO NATURAL AND ARTIFICIAL ROUGHNESS ELEMENTS. *Army Electronics Command, White Sands Missile Range, N. M., Atmospheric Sciences Lab., DA Task IT061102B53A-17, TR-ECOM-5372, OSD-1366, 63p., April 1971. 51 refs.*

NTIS: AD 730638

The idealized canopy concept for air flow is applied to a variety of natural and artificial vegetation types. Twelve different canopy types are examined, and both natural and artificial roughness elements are considered. The canopy flow characteristics investigated are wind profile shapes, intensity of turbulence distributions, the attenuation coefficient as an index of canopy flow, and a relationship of canopy density and element flexibility to vegetation types. Canopy flow is a function of canopy density, element-flexibility, and height; behavior of artificial canopy elements is compatible with that of natural vegetation; the attenuation coefficient varies with stage of growth and increases with increased density and flexibility. The attenuation coefficient increases in an orderly manner as canopy architecture becomes progressively complex.

21499 APTIC NO. 39973

Cooper, Charles F.

EFFECTS OF PRESCRIBED BURNING ON THE ECOSYSTEM. *Forest Service, Asheville, N. C., Southeastern Forest Experiment Station and Duke Univ., Durham, N. C., Prescribed Burning Symp. Proc., Charleston, S. C., 1971, p. 152-160. 16 refs. (April 14-16.)*

The effects of prescribed burning on regional water supplies, on regional and global atmospheric phenomena, and on people are discussed as well as ecologic stability in silvicultural systems that may include prescribed burning and the role of prescribed burning in a regional land-use policy. The role of forests in regulating atmospheric carbon dioxide depends wholly on the total quantity of reduced carbon in the biomass of the region. Only to the extent that silvicultural practices, including prescribed burning, reduce the mean live and dead biomass of an entire region below that which it would be in the absence of burning is the average CO2 content of the atmosphere significantly affected. The difference in quantity of fixed carbon in burned and unburned stands is too small to affect the global CO2 balance significantly. Other biologically active constituents of the atmosphere not likely to be affected by prescribed burning include sulfur dioxide, nitrogen, and photochemical smog. Burning of forests and forests wastes appears to be a major source of airborne particles on a global scale, but global effects on atmospheric turbidity do not seem to warrant ruling out the practice of prescribed burning. Possible effects on precipitation processes are also discussed. A permanently productive forest system is more likely if small blocks, differing in age and composition and each handled according to a different management prescription and operational schedule, are emphasized.

21500 APTIC NO. 39854

Davidson, Ward F.

STACK METEOROLOGY AS RELATED TO POWER PLANTS. *Interdepartmental Committee on Air Pollution, Washington, D. C., Air Pollut., Proc. U. S. Tech. Conf., Washington, D. C., 1950, p. 802-806. 7 refs. (May 3-5, Louis C. McCabe, ed.)*

Advantages of high stacks have been understood in a general way, and high stacks have been common on large power stations for many years. Frequently a considerable part of the height was obtained by placing the stack on top of the boiler house, which was usually the highest part of the power house building. It was not appreciated until comparatively recently, however, that the elevation of the top of the stack above ground level was not the sole criterion. Studies using models in an aerodynamic wind tunnel forcefully called attention to the influence of the building on the flow of air and emphasized the effect of down draft on the lee side of the power house. The use of models in wind tunnels is discussed Photographs are presented which indicate the magnitude of the changes in the plume that can result from modifications of building shape or proportions. A point on which there is still considerable disagreement involves the effects of excess stack gas temperature on the trajectory of the plume. Some analysis of meteorologic data is necessary as a background for the intelligent interpretation of the results of aerodynamic analyses. This would include data concerning wind speed and direction.

21501 APTIC NO. 40069

Dmitriyev, M. T., N. A. Kitrosskiy, and V. Z. Alperin

CITY HIGHWAY AIR POLLUTION, AS AFFECTED BY TRAFFIC AND BY BUILDING HEIGHT AND DENSITY. *(Zavisimost toksikatsii vozdukha avtomagistraley gorodov ot intensivnosti dvizheniya, vysoty i plotnosti zastroyki). Text in Russian. Izv. Vyssh. Ucheb. Zaved., Stroit. Arkhitek., 14(3):120-124, 1971. 1 ref.*

Automobile exhaust constitutes a basic source of air pollution in large city centers. Nitrogen oxides, carbon monoxide, xylene, crotonic aldehyde, methylethylketone, ethylene, acetylene, phenol, toluene, benzene, and propylene constitute its main ingredients. Automobile exhaust toxicity increases during the warm season which is associated with higher ultraviolet radiation intensity and enhanced photochemical processes. Thus ozone concentrations of 0.22 mg/cu m increase the exhaust toxicity by 260%, including the generation of additional pollutants such as formaldehyde, acetaldehyde, acrolein, methanol, acetone, nitromethyl, propene, organic peroxides, epoxides, nitrates, and nitriles. Tentative computation of atmospheric toxicity occurring in front of 50 m high apartment buildings located along 50 m wide main traffic routes are presented. Attempts to compute a figure for permissible automobiles per time unit, assuming certain exhaust figures, speed conditions, wind, building height, and density are made. Buildings 50-70 m high should be alternated with low buildings and be located to create a zig-zag on both sides of the road to provide better ventilation conditions of the main traffic roads. Buildings of the main roads oriented from ea5st to west decrease the concentration of atmospheric photooxidants. Tall buildings should be located on the southern portion of the main traffic roads, and keeping the traffic low during the noon hours would contribute to a decrease in photooxidation products. Green areas and wetting of roads during the hot hours of the day, as well as other means applied to increase the atmospheric humidity decrease the atmospheric toxicity. However, these measures alone cannot provide sufficient air quality protection unless new, improved engines are developed.

21502 APTIC NO. 40660

Dovgalyuk, Yu. A.

COMPUTATION OF PARTICLE GROWTH IN PRECIPITATIONS IN A DEVELOPING CONVECTION CLOUD. *(K raschetu rosta chastits osadkov v razvivayushchemsya konvektivnom oblake). Text in Russian. Tr. Gl. Geofiz. Observ. (Leningrad), no. 262:87-93, 1971. 4 refs.*

Drop growth processes in multi-impulse convection cloud development were studied. The drop growth is primarily dependent on the character of the rising currents inside the cloud; the vertical cloud development occurs in the form of successive impulses, the maximum number of which is four. Both the maximum lifting height and the final drop radius are chiefly determined by repeated ascending currents. Drop growth processes were computed with parameters such as pulse duration (1-30 min), pulse interval (0-30 min) and maximum vertical speed (2-20 m/sec) for drop radii of 6-20 micron. Growth by condensation and gravity coagulation was assumed for clouds with a lower interface of 1000 m and a temperature of 6 C. The calculations reveal decreased drop size and extended retention time in the cloud with increased impulse durations. Maximum drop size was obtained for zero pulse interval. Reduced pulse durations result in an increase of the number of possible impulses during the retention time. An optimum pulse count of two was determined for current speeds of 6.9 and 12 m/sec, 15-minute in pulse duration, zero pulse interval, and drop radii of 6-20 micron.

21503 APTIC NO. 40087

Eschenroeder, A. Q. and J. R. Martinez

CONCEPTS AND APPLICATIONS OF PHOTOCHEMICAL SMOG MODELS. *General Research Corp., Santa Barbara, Calif., National Air Pollution Control Administration Contract CPA 22-69-127, CRC-APRAC Proj. CAPA-7-68, Air Pollution Control Office Contract EHSD 71-22, TM- 1516, 124p., June 1971. 88 refs.*

Following an overview of mathematical methods of analyzing air pollution, detailed developments of inputs, techniques, and validations were presented for photochemical smog modeling. Finite difference formulations are employed to compute concentration histories. The chemical kinetics are expressed as lumped parameter reaction mechanisms derived from laboratory data in the literature. Turbulent diffusion coefficients, which depend on height and time, come from atmospheric measurements. Inputs consist of source inventories for the Los Angeles basin and solar irradiation curves for the appropriate days. Predicted time histories of reactive hydrocarbons, oxides of nitrogen, and ozone are consistent with the variations observed at air monitoring stations. With refined descriptions of advection, the mathematical model will serve as a tool in planning legislation and guiding urban planning in the future. (Author abstract modified)

ATMOSPHERIC INTERACTION

21504 APTIC NO. 40012

Fernald, Frederick G., Benjamin M. Herman, and John A. Reagan

DETERMINATION OF AEROSOL HEIGHT DISTRIBUTIONS BY LIDAR. *J. Appl. Meteorol., 11(3):482-489, April 1972. 13 refs.*

A new analytic solution to the lidar equation is presented which realistically considers the scattering properties of the aerosols and the molecular atmosphere individually. With this solution, in turbid atmospheres where the aerosols dominate the scattering properties, accurate vertical profiles of the volume extinction cross section can be obtained with an uncalibrated lidar, provided that the total transmittance of the atmospheric layer being investigated is known. This solution is applied to data samples collected under very clear and under very dusty conditions. (Author abstract)

21505 APTIC NO. 40703

Gorchakov, G. I., A. A. Isakov, and L. N. Markina

DETERMINING THE PRINCIPAL PARAMETERS OF FOG MICROSTRUCTURE FROM THE AUREOLE INDICATRIX. *(Opredelenie osnovnykh parametrov mikrostruktury tumana po oreol noy indikatrise). Text in Russian. Akad. Nauk SSSR, Fiz. Atmosfery i Okeana, 8(1):93-98, 1972. 14 refs.*

A method for determining the parameters of the microstructure of aerosols is described. The gamma-distribution model of the particle size was applied to describe the microstructure of aerosols. Since both the model diameter and the particle concentration were eliminated from the gamma-distribution function, the normalized second moment of the aureole indicatrix was dependent on one distribution parameter only. Polydisperse aureole indicatrices were computed for gamma-distributions with various values of the above distribution parameter. The method of determining the parameters of the aerosol microstructure from the second moment of the aureole indicatrix was applied to the analysis of the aureole indicatrices of three different natural fogs, and the dependence of the coefficient of the oriented light diffusion of the scattering angle was determined from the microstructure parameters. The gamma-distribution model was highly suitable for the description of the light diffusion at small angles in certain cases. The method has the advantages of requiring short time for the measurement (about 2 min) and of not influencing the medium investigated.

21506 APTIC NO. 40765

Gruss, Rolf

LASER WAVE PROPAGATION THROUGH THE ATMOSPHERE. *(Uebertragung von Laserstrahlung durch die Atmosphaere) Text in German. Nachrichtentech. Z., no. 3:184-192, 1969. 90 refs.*

Laser wave propagation through the atmosphere, including the effect of the weather and transmission losses through absorption, scatter, and turbulence, were studied, and various propagation experiments were performed to determine the practical application of laser systems in communications. The experiments were performed in the visible red spectrum at 0.6328 micron with HeNe gas lasers and a power output between 10 and 100 mW. At the receiving end the laser waves were intercepted by a parabolic mirror 60-150 cm in diameter. The intensity of the laser rays was registered as a function of time and meteorologic parameters were recorded. Measurements over a 20-km distance disclosed no atmospherically induced deflection of the laser rays which would exceed the mirror diameter of 150 cm. The 10-mW laser tubes had a life of 1000 hr; the 100 mW tubes, a life of 1500 hr. The effects of absorption, scatter, turbulence, and refraction on laser intensity over various distances were analyzed; the results indicated that in communications, lasers can best be used over distances of 3-5 km. To insure continuity of transmission, the power output must be raised to about 10 W. Laser use is not advisable in areas with high humidity (e.g., wooded areas) and poor visibility. One promising application is in urban areas where laying of cables is not practical.

21507 APTIC NO. 39965

Hampson, R. F., W. Braun, D. Garvin, J. T. Herron, R. E. Huie, M. J. Kurylo, A. H. Laufer, H. Okabe, and W. Tsang

CHEMICAL KINETICS DATA SURVEY. II. PHOTOCHEMICAL AND RATE DATA FOR FIFTEEN GAS PHASE REACTIONS OF INTEREST FOR STRATOSPHERIC CHEMISTRY. *National Bureau of Standards, Washington, D. C., Inst. for Materials Research, Proj. 3160409, Rept 10828, 90p., April 1972. 163 refs. (Available from the Chemical Kinetics Information Center, National Bureau of Standards, Chemistry Building, Room A158, Washington, D. C. 20234.)*

Photochemical and rate data have been evaluated for fifteen gas phase reactions of interest for the chemistry of the stratosphere. The results are presented on data sheets, one per reaction. For each reaction the data sheets provide an estimate of the most reliable value for a rate constant or quantum yield, if at all possible; an estimate of the accuracy of that value; sufficient information to make apparent the basis on which the value rests; and a summary of the available data. Reactions surveyed are (1) nitrous acid plus oxygen ion yields hydroxide radical plus nitrogen dioxide; (2) nitric acid plus photon; (3) nitric acid plus oxygen ion yields HO radical plus nitrogen trioxide; (4) HO plus ozone yields products; (5) HO2 plus HO2 yields hydrogen peroxide plus oxygen; (6) water plus nitric anhydride yields two nitric acid; (7) water plus O(1D) yields two HO; (8) H2O2 plus photon; (9) H202 plus nitric oxide yields products; (10) NO plus 03 yields NO2 plus O2; (11) nitrous oxide plus O91D) yields nitrogen plus O2 or yields 2NO; (12) O(3P) plus O3 yields 2O2; (13) O2(1-delta) plus third body yields O2 plus third body; (14) O3 plus photon (visible); and (15) O3 plus photon (ultraviolet).

21508 APTIC NO. 39966

Hampson, R. F., R. L. Brown, D. Garvin, J. T. Herron, R. E. Huie, J. D. McKinley, and W. Tsang

CHEMICAL KINETICS DATA SURVEY. I. RATE DATA FOR TWELVE REACTIONS OF INTEREST FOR STRATOSPHERIC CHEMISTRY. *National Bureau of Standards, Washington, D. C., Inst. for Materials Research, Proj. 3160409, Rept. 10692, 45p., Jan. 1972. 61 refs. (Available from the Chemical Kinetics Information Center, National Bureau of Standards, Chemistry Building, Room A158, Washington, D. C. 20234.)*

Rate data have been evaluated for twelve gas phase reactions of interest for the chemistry of the atmosphere. The results are presented on data sheets, one per reaction. For each reaction there is an estimate of the most reliable value for a rate constant or quantum yield, consistent with the present state of the art, an estimate of the accuracy of this value, and sufficient information to explain the basis upon which the value was chosen. Reactions surveyed are: (1) hydrogen ion plus HNO yields hydrogen plus nitric oxide; (2) H plus nitrous acid yields H2 plus nitrogen dioxide, or yields water plus NO; (3) H plus nitric acid yields HNO2 plus hydroxide radical, or yields H2 plus nitrogen trioxide, or yields water plus NO2; (4) H plus NO2 yields HO radical plus NO; (5) hydrogen radical plus ozone yields HO plus oxygen; (6) HNO plus NO yields water plus nitric oxide; (7) HNO2 plus HO yields water plus NO2; (8) HNO3 plus HO yields water plus NO3; (9) water plus NO plus NO2 yields 2HNO2; (10) NO2 plus oxygen ion plus a third body yields NO3 plus a third body; (11) NO2 plus ozone yields NO3 plus oxygen; and (12) collisional quenching of oxygen.

21509 APTIC NO. 39957

Harwick, Robert

SMOG RESEARCH. *Oil Gas J., 48(31):47-48, Dec. 8, 1949.*

Petroleum refinery operations have been blamed by the media and statements of public officials as a significant cause of smog in the Los Angeles area. The results to date of industry sponsored research indicate that smog is not a mixture of smoke and fog as in other areas of the U. S., but rather is a complex mix of gases and particulates in which geography, topography, and temperature inversion are important. An unexpected and unexplained finding is the presence of large amounts of ozone. Within the past several years the west coast oil industry has spent over $10 million on smoke and fume control facilities. The next step will be an effort to trace known contaminants back to their source.

21510 APTIC NO. 40664

Herzog, J.

SOLAR RADIATION CONDITIONS IN MUNICH. *(Die Sonnenscheinverhaeltnisse in Muenchen). Text in German. Meteorol. Rdsch., 25(2):54-57, 1972.*

Differences in the duration of sunshine recorded over the last 15 yrs in the urban area of Munich and at Munich-Riem airport were studied to determine whether the increase in the dust concentration over the city has substantially reduced the amount of sunshine. Minor differences were observed, and the yearly variations for Munich and Munich-Riem were fairly uniform. The decrease in the amount of sunshine from October to November was about 50%. The urban area has always had less sunshine than the open country during spring and summer, and this situation has not appreciably worsened over the last 15 yrs. Munich-Riem had more sunshine during February through September, and less during October through January than the city, but the slight differences were probably caused by different fog conditions. Five-year means revealed an increase in the amount of sunshine at Munich-Riem during spring and summer, probably caused by the persistence of convective clouds over the city. The weather conditions were about the same in fall and winter, and in December the city enjoyed even more sunshine than the airport. Yearly averages revealed more sunshine at Munich-Riem than in the city and a decrease in both areas, particularly at the airport, where no increase in dust emissions could be determined. The decline in sunshine over the period 1966-1970 as against the two preceding 5-year periods was due less to increased pollution than to the general weather situation which often created conditions favoring mist and fog in flat country. This explanation was supported by the fact that only slight decreases were measured in elevated areas.

21511 APTIC NO. 39850

Hewson, E. Wendell

METEOROLOGICAL ASPECTS OF ATMOSPHERIC POLLUTION. *Interdepartmental Committee on Air Pollution, Washington, D. C., Air Pollut., Proc. U. S. Tech. Conf., Washington, D. C., 1950, p. 775-786. 33 refs. (May 3-5, Louis C. McCabe, ed.)*

The description of the behavior of a contaminant while it is airborne presents a complex meteorologic problem. The most intensive studies have been concerned with pollution from a single source. Portrayal of the distribution of gas or smoke from a surface point source, surface line source, elevated point source, and an elevated area source, is considered. A number of special factors may operate to modify drastically the general behavior of an effluent: e.g., the sudden increase in turbulence near the surface which often occurs shortly after sunrise in summer, and the presence of an inversion or isothermal layer a relatively short distance above the smoke plume accompanied by instability below. Ground deposition of aerosols from an effluent may be a significant factor in reducing concentrations. Coagulation and topographic interactions are also important factors. The dependence of the behavior and surface distribution of contaminants from multiple sources as a function of wind speed, rainfall, stability, and topography is considered. The influence of pollution on rainfall and fog is discussed. Methods of minimizing pollution may include increasing stack heights and temperatures, as well as varying emission according to meteorologic conditions.

21512 APTIC NO. 40133

Hicks, James R. and Motoi Kumai

ICE FOG MODIFICATION BY USE OF HELICOPTERS. *Army Cold Regions Research and Engineering Lab., Hanover, N. H., Army Material Command Proj. 1T061102B52A, Army Electronics Command Proj. 1T062111A126, SR-162, 11p., Sept. 1971. 10 refs.*

NTIS: AD 731215

Increasing the knowledge of the physical and optical properties of ice fog and developing techniques for its dispersal are discussed. Two series of flight tests to determine the effects of CH-47 helicopter downwash on ice fog were conducted near Ft. Wainwright, Alaska, in Jan. 1971. During the first series, clearings were produced which were large enough for helicopter operations. This series of tests was conducted when the ice fog was in a dissipating state. The second series of tests was conducted in a denser ice fog during its developing stage. The same flight procedures were used, but clearings were not produced. It is recommended that research be continued to determine all meteorological conditions under which clearing can be accomplished, as well as the actual process or combination of processes by which clearing can be accomplished.

21513 APTIC NO. 40177

Hidy, G. M., W. Green, and A. Alkezweeny

INADVERTENT WEATHER MODIFICATION AND LOS ANGELES SMOG. *J. Colloid Interface Sci., 39(1):166-271, April 1972. 14 refs. (Presented at the American Chemical Society, Kendall Award Symposium, Los Angeles, Calif., March 28 - April 3, 1971.)*

The potential mechanisms for inadvertent weather modification by anthropogenic aerosols are reviewed briefly. Within this framework, limited measurements of cloud condensation nuclei and ice nuclei taken during the 1969 Pasadena experiment are discussed. The condensation nuclei observations were made with an MRI thermal diffusion counter and the ice nuclei were made using a Millipore filter technique. The results suggest that the cloud condensation nuclei counts are in the range of 1000/cu cm at 0.5% water vapor supersaturation, and they increase during the day in rough correspondence with the second moment of the aerosol distribution. On the other hand, the ice nuclei counts are in the range of 200/cu m at 18 C, and appear to decrease during the day. Such diurnal behavior may be related to the poisoning of otherwise active nuclei in the presence of organic material in the Los Angeles atmosphere.

21514 APTIC NO. 40426

Hidy, G. M., P. K. Mueller, Y. Tokiwa, and S. Twiss

AEROMETRIC FACTORS AFFECTING THE EVOLUTION OF THE PASADENA AEROSOL. *J. Colloid Interface Sci., 39(1):287-304, April 1972. 19 refs. (Presented at the American Chemical Society, Los Angeles, March 28- April 3, 1971.)*

The meteorological background and the aerometric measurements conducted during the 1969 Pasadena smog experiment are described. Observations of the winds, the air temperature, humidity, and incoming solar radiation at the experiment site, with support of U. S. Weather Bureau data, indicated that the weather during the study was generally quite regular and was consistent with the Southern California climatology. The winds were light and mainly from the south-west sector during the day, indicating that the polluted air observed in Pasadena would be a complicated mixture of material produced locally and entering the area from distant sources. The observations of such gases as carbon monoxide nitric oxide, nitrogen dioxide, oxidant (mostly ozone), hydrocarbons, and sulfur dioxide bore out this conjecture in that the hourly concentration patterns were somewhat variable from day to day. The diurnal averages of such data were more revealing in trends, however, showing typical changes of gases linked with the smog reactions observed during other similar studies. Of particular interest was the simultaneous peaking of SO2 with ozone at midday. Accompanying the midday maximum of ozone was a maximum in the scattering coefficient as observed by an integrating nephelometer. The frequently observed visibility restrictions during periods of photochemical smog formation have been associated with changes occurring principally in the 0.1 to 1.0 micron diameter range of particles. Comparison between the diurnal average variations of the total number concentration of aerosols, the average surface area (S) and the volume fraction (V) showed different behavior. While (N) increased throughout the daylight hours until late afternoon, (V) displayed a peak at midday in a manner similar to the behavior of ozone. The (S) showed a broad maximum through the daylight hours. Since (S) and (V) are linked mianly with the fraction of suspended particles greater than 0.1 micron diameter, this portion of the particle size spectrum may have evolved by photochemically induced interaction with the suspending gases. Two possible mechanisms for the growth of the large particle fraction are inferred. The first involvos heterogeneous nucleation of condensable vapors, and the second postulates a combination of particle coagulation and photochemical reactions of low molecular-weight hydrocarbons, nitrogen compounds, and sulfur dioxide on the surface of small particles. (Author abstract)

21515 APTIC NO. 40513

Hirst, Eric

ANALYSIS OF BUOYANT JETS WITHIN THE ZONE OF FLOW ESTABLISHMENT. *Oak Ridge National Lab., Tenn., Atomic Energy Commission Contract ORNL-TM-3470, 46p., Aug. 1971. 20 refs.*

To assess the ecological consequences of thermal discharges from steam-electric power plants, the physical changes induced by these discharges must be predicted. The mathematical prediction of these physical properties in the Zone of Flow Establishment (ZFE), for thermal effluents discharged as buoyant jets through round, submerged diffusers is discussed. The ZFE is the region, immediately beyond the diffuser exit, in which the mean flow profiles undergo a transition from their internal flow shapes to a free turbulent flow condition. The method uses the integral equations of mass, energy, salt, and momentum conservation. The solution to these equations includes the length of the ZFE, and the values of jet width, jet orientation, and centerline temperature and salinity at the end of this zone. The results obtained agree well with the experimental data available and with existing semi-empirical correlations. The range of flow variables covered by the data and correlations is quite small. Predictions of starting length, jet width, centerline temperature, and jet orientation at the end of the ZFE are presented for several Froude number, velocity ratios, and initial orientation combinations. This method can be used to provide the necessary initial conditions for conventional buoyant jet prediction methods. It can also be used to help design optimal thermal discharge configurations. (Author abstract modified)

21516 APTIC NO. 39856

Holland, Joshua Z.

THE DIFFUSION PROBLEM IN HILLY TERRAIN. *Interdepartmental Committee on Air Pollution, Washington, D. C., Air Pollut., Proc. U. S. Tech. Conf., Washington, D. C., 1950, p. 815-821. 3 refs. (May 3-5, Louis C. McCabe, ed.)*

An approach is sought which will enable one to reconcile the atmospheric diffusion phenomenon in hilly terrain with the findings of investigators in level and mountainous country. The area under study at Oak Ridge is characterized by long broken ridges, oriented WSW-ENE, having an average height of about 300 ft above the valley floor, and spaced approximately a mile apart. From a comparison of average pilot balloon wind speed profiles at Oak Ridge and Knoxville Airport, a relatively level area some 25 mi away, it can be seen that the gross effect of the hills is to increase the surface drag on the atmosphere. Sutton s equations can be used to obtained approximate diffusion figures, at least for neutral or lapse conditions. Similarly, although the wind profile does not follow a strict logarithmic law, the classical roughness parameter may be evaluated by assuming a log-law in a given layer. A more rewarding parameter is the friction velocity derived from the logarithmic law. This parameter appears to be constant throughout the day and night in the lower 175 ft and to have two distinct but relatively constant values in the layer between 175 and 525 ft. Two clear regimes are indicated: 5in the unstable regime, the friction velocity is small and constant 5with height, and in the stable regime the friction velocity is much 5larger above the ridge than within the valleys. Two distinct regimes are suggested, characterized by the presence in one, and the absence in the other, of the hills as roughness elements. The Richardson number is suggested for the lower 1000 ft, as a criterion for sorting out the stable and turbulent flow regimes.

21517 APTIC NO. 40347

Holzworth, George C.

MIXING, WIND SPEEDS, AND POTENTIAL FOR URBAN AIR POLLUTION THROUGHOUT THE CONTIGUOUS UNITED STATES. *Office of Air Programs, Research Triangle Park, N. C., Div. of Meteorology, Pub-AP-101, 129p., Jan. 1972. 20 refs.*

NTIS: PB 207103, GPO: 1972-484-482 45 1-3

The mixing-layer height and the average wind speed within the mixing layer were calculated twice for each day of a 5-year record of upper air observations at 62 National Weather Service stations in the contiguous United States. A rough allowance was made for effects of the urban heat island on the morning mixing heights. The morning and afternoon times coincide approximately with those of maximum and secondary minimum concentrations of slow-reacting pollutants in cities. These calculations illustrate the typical large diurnal variation in atmospheric dispersion. Twenty charts present seasonal, annual, morning, and afternoon mean mixing heights and wind speeds. A model of some general dispersion features over urban areas is described in which the normalized pollutant concentration averaged over a city is a function of mixing height, wind speed, and city size. Frequency values of mixing height by wind speed are used with the model to calculate average normalized concentration frequencies for each weather station. Thirty charts present isopleth analyses of seasonal, annual, morning, and afternoon normalized pollutant concentrations that were exceeded 10, 25, and 50% of the time for specified city sizes. The occurrence of episodes during which upper limits on mixing height and wind speed were not exceeded were determined from the daily morning and afternoon values of these parameters. Isopleths of the total number of episode-days for episodes lasting at least 2 days and at least 5 days with various limiting mixing height and wind-speed values are presented in 20 charts. (Author abstract modified)

21518 APTIC NO. 40502

Husar, R. B., K. T. Whitby, and B. Y. H. Liu

PHYSICAL MECHANISMS GOVERNING THE DYNAMICS OF LOS ANGELES SMOG AEROSOL. *J. Colloid Interface Sci., 39(1):211-224, April 1972. 20 refs.*

The aerosol size distributions measured during the 1969 Pasadena Smog Study and those obtained later in laboratory smog-simulation experiments are analyzed. Emphasis is on the identification of physical mechanisms and parameters which are responsible for the daily aerosol concentration changes. The role of relative humidity, solar radiation intensity, coagulation, and condensation is discussed. Data from field measurements and artificial humidification experiments indicate that by changing the relative humidity, the submicron aerosol volume concentration, as well as the total light scattering, may be changed by at least a factor of two. The effect of solar radiation on the photochemical gas-particle conversion rate was investigated by inflating a plastic bag with particulate-free ambient air and exposing it to solar radiation. The observed nuclei-generation rates in Pasadena were on the order of 10 to the 5th power nuclei/sec. The solar radiation was necessary for the nuclei production. Laboratory experiments performed in Minnesota suggest that the growth of photochemical nuclei after formation is governed by simultaneous coagulation and condensation. During late night hours, the aerosol decayed according to the laws of coagulation. The size distributions approached a universal form which could be simulated by laboratory aging experiments and by numerical (Monte Carlo) simulation. The mean coagulation coefficient for the smog decay was between 2 times 10 to the minus 10th power and 10 to the minus 8th power cu cm/sec. During the daytime, coagulation limited the total number concentration 2 times 10 to the 5th power per cu cm by rapid removal of small particles (0.01 micron) by the larger ones (0.1 micron). It appears that the important particle diameter range between 0.1 and 1.0 micron, which on the average contains about 60% of the total aerosol mass fraction, was not affected significantly by coagulation. A comparison of field data with laboratory experiments and numerical calculations suggests that the noontime accumulation of aerosol mass in the 0.1 to 1.0 micron subrange is primarily due to condensation of photochemically produced supersaturated vapors on the existing particles.

21519 APTIC NO. 40505

Inoue, Kentaro

RELATIONSHIP BETWEEN SULFUR DIOXIDE CONCENTRATION AND METEOROLOGICAL CONDITION IN MIZUSHIMA INDUSTRIAL DISTRICT. REPORT I (RELATIONSHIP AMONG SULFUR DIOXIDE CONCENTRATION AND WIND DIRECTION, WIND VELOCITY AND ATMOSPHERIC STABILITY). *(Mizushima rinkai kogyo chitai ni okeru taiki osen to kisho joken ni tsuite. Daiippo. Aryusan gasu nodo to fuko fusoku taiki anteido to no kankei). Text in Japanese. Okayama Igakai zasshi (J. Okayama Md. Soc.), 81(3/4):127-134, April 1969. 11 refs.*

The relationship between the frequency of high concentrations of sulfur dioxide (over 0.2 ppm) wind direction and velocity, and Pasquill s stability, and between average concentration of sulfur dioxide and wind direction and velocity was investigated. The S, SSW, SW, and WSW winds (mainly sea breeze) bring the air pollutant to the northern part in the Mizushima industrial area. Higher concentrations of sulfur dioxide in Fukuda-cho, Minami Kasuga-cho, and Amagi were correlated with S, SW, and SSW winds of 3-4 m/sec. In the Mizushima Harbor Office; high sulfur dioxide concentrations were measured in S and SW winds of 2-3 m/sec, and SW winds of 2-5 m/sec. Average sulfur dioxide concentrations were higher in S and SW winds of 2-4 m/sec in Fukuda-cho and Minami Kasuga-cho and higher in SSE winds of 6 m/sec, SSW wind of 6-7 m/sec, SW winds of 2-5 m/sec, and S winds of 3 m/sec in the Mizushima Harbour Office. Unstable sea breezes bring higher concentrations of sulfur dioxide to Fukuda-cho and more stable sea breeze brings higher concentrations to Amagi. From calculations of diffusion by Pasquill s chart, diffusion in C-stability for Fukuda-cho and diffusion in D-stability for Amagi were correlated with higher SO_2 concentrations.

21520 APTIC NO. 40500

Kerker, Milton

SOME OPTICAL AND DYNAMICAL PROPERTIES OF AEROSOLS. *J. Colloid Interface Sci., 39(1):2-24, April 1972. 28 refs. (Presented at the American Chemical Society Meeting, Los Angeles, Calif., March 30, 1971.)*

Three recent experiments are reviewed: a study of Brownian coagulation; a study of the scavenging of aerosol particles by a freely falling water droplet; and a study of multiple scattering. Two important techniques involved in these experiment are the laboratory preparation of aerosols, both liquid and solid, having a narrow distribution of sizes in the 0.01 micron range and the particle size analysis of such aerosols by light scattering. The strategy of the coagulation experiment is to calculate the particle size distribution of the aerosol from the light scattering data obtained prior to entry into the coagulation chamber. This must occur early enough in the life history of the aerosol so that the distribution is sufficiently narrow and unimodal. The size distribution of this initial aerosol is then calculated as a function of time using Smoluchowski s theory. Theoretical light-scattering results corresponding to the distribution for the coagulated system can then be calculated and are compared with the experimental light scattering data for the coagulated aerosol. In the second experiment, the collection efficiency of water droplets for aerosol particles was studied by examination of a single water droplet freely falling through a silver choloride aerosol consisting of a relatively uniform distribution of spherical particles with radii in the range of several tenths of a micron. The particle size distribution of the aerosol was determined by light scattering. The amount of AgCl scavenged by the droplet was analyzed by a very sensitive colorimetric technique In the third experiment, a simulation is devised for the effects of photon encounters in the atmospheric aerosol and in air itself.

21521 APTIC NO. 40745

Kirchner, Edward A.

THE HEAT EQUATION AS A MODEL FOR AIR POLLUTION. *Preprint. Washington Univ., St. Louis, Mo., Sever Inst. of Tech., 67p., Jan. 1971. 72 refs.*

The heat equation is adapted to the problem of air pollution by the incorporation of simple mathematical functions for meteorological behavior. Over 50 mathematical solutions are tabulated showing the complete model and its solution. Some examples of the limitations on the mathematical application of the heat euqation are: there can be no simple expression for the temperature profile valid at all times of the day; no simple function is adequate to describe the ground effect for large degrees of roughness; the diffusive nature of turbulence is difficult to describe as diffusion takes place more rapidly horizontally than vertically; two different physical systems exist, one for gaseous matter, and one for particulates; another factor not considered explicitly is the effect of chemical degradation. The effect of atmospheric turbulence has especially limited the achievement of analytical solutions. (Author abstract modified)

21522 APTIC NO. 40452

Klaar, Justus

CONVECTION-FREE DIFFUSION CLOUD CHAMBER FOR LOW TEMPERATURES. *(Eine Diffusionswolkenkammer fuer tiefe Temperaturen). Beitr. Physik Atmosphaere, vol. 45:174-183, 1972. 13 refs.*

A cylindrical, low temperature, thermal diffusion cloud chamber used to study temperature and humidity conditions for ice particle formation on airborne aerosol particles is described. The air inside the chamber is nearly free of convective motions. Thus, the humidity field can be computed on the basis of molecular diffusion of water vapor, as a function of top and bottom temperatures. In the case where vapor density is near saturation with respect to water, the computed values agree fairly well with experimental data. The chamber allows an exact statement of temperature and humidity in its interior, so that airborne particles may be exposed to known supersaturation and temperature conditions. With a set of outer insolation wrappings combined with a set of inner metal walls of suitable thickness profiles, it would be possible to operate the chamber at temperatures down to below -40 C. This would simulate conditions of the cirrus-niveau, and determine whether sublimation plays a part in cloud formation at lower temperatures.

21523 APTIC NO. 40184

Kravchenko, I. I., S. O. Lekhtmakher, and L. S. Ruzer

CALCULATION OF DIFFUSIONAL DEPOSITION OF AEROSOL PARTICLES OF LOGNORMAL SIZE DISTRIBUTION IN CYLINDRICAL CHANNELS. *Colloid J. (USSR) (English translation from Russian of: Kolloidn. Zh.), 33(6):774-775, May 1972. 2 refs.*

Formulas for diffusional deposition of monodisperse aerosol particles were taken from the literature. The integration was performed on a computer with error not exceeding 1%, for which it is sufficient to take r sub g times beta sub g to the minus 3rd power and r sub g times beta sub g to the 3rd, where r sub g is the mean geometric radius, and beta sub g is the standard geometric deviation, as the lower and upper size limits. Neighboring families of curves virtually coincide when shifted along the t axis; it is therefore possible with the aid of the diagram to obtain curves for intermediate radius values by moving the nearest family, corresponding to r sub g minus delta, through the distance: delta t equals log of D times the quantity r sub g minus delta, divided by D times r sub g, where D is the diffusion coefficient of the particles, in sq cm/sec.

21524 APTIC NO. 40672

Laktionov, A. G. and L. I. Yermoshina

COMPARING THE CLOUD CONDENSATION AND AITKEN NUCLEI CONCENTRATIONS OCCURRING IN THE OPEN ATMOSPHERE. *(Sopostavleniye kontsentratsiy oblachnykh yader kondensatsii i yader Aytkena v svobodnom atmosfere). Text in Russian. Tr. Inst. Eksp. Meteorol., no. 20:61- 64, 1971. 5 refs.*

Results of cloud and Aitken particle measurements are described. The concentration measurements were carried out outside developing convective clouds with a maximum supersaturation of 0.25% in altitudes ranging from 100 to 3,000 m over land and sea. Both the absolute values and the variations with height of the cloud condensation and Aitken nucleus concentrations as obtained over land and sea were different. Measurements at 200 m altitude over and revealed maximum Aitken nucleus concentrations of 3800-6800/ cu cm, while the corresponding values for active cloud nuclei were 300-1000/cu cm. Maximum Aitken nucleus concentrations of 5500-600/ cu cm and cloud nucleus concentrations of 200-300/cu cm over sea were measured. The total cloud nucleus concentrations at 200 and 300 m over land accounted for 25% and 50% of the maximum Aitken nucleus concentrations, respectively, while the corresponding value for sea atmosphere was 70-90%. The concentration of slightly active nuclei was much lower over sea than over land. The decrease in the Aitken nuclei concentration from 200 to 1000 m altitude over land was about 100%, while that in the cloud nucleus concentration did not exceed 30%. The decrease in the Aitken nuclei concentration was slower than that in the cloud nuclei concentration from 1000 to 3000 m due to the intense washout of active cloud condensation nuclei. The variations with height over sea were uniform due to the low Aitken nuclei concentration and the reduced rate of coagulation.

21525 APTIC NO. 40548

Lamb, Robert G.

THE REPRESENTATION OF ATMOSPHERIC MOTIONS IN URBAN DIFFUSION MODELS. *Preprint, American Meteorological Society, Boston, Mass. and Air Pollution Control Assoc., p. 5-7, 1971. 1 ref. (Presented at the Conference on Air Pollution Meteorology, Raleigh, N. C., April 5-9, 1971.)*

A more precise technique for describing wind velocity components than that described by available velocity time, histories was developed. The character of the diffusion process is strongly dependent of the definition of turbulence. Serious errors can result either from treating certain scales of the atmospheric motions twice, i.e., as a mechanism of both advection and diffusion, or from neglecting those motions altogether. Deterministic and turbulent velocity components and the resulting diffusion phenomena are examined.

21526 APTIC NO. 40771

Luna, R. E. and H. W. Church

A COMPARISON OF TURBULENCE INTENSITY AND STABILITY RATIO MEASUREMENTS TO PASQUILL TURBULENCE TYPES. *Preprint, American Meteorological Society, Boston, Mass., p. 35-39, 1971. 8 refs. (Presented at the Conference on Air Pollution Meteorology, Raleigh, N. C., April 5-9, 1971.)*

The Pasquill method is used for estimating the degree of dispersion of windborne material released near ground level. It uses wind speed class and degree of insolation as determinants of six stability categories (A through F, in order of increasing stability) which specify values of the horizontal and vertical spread of material released. A means of relating the degree of spread to the characteristics of the wind azimuth and elevation angle fluctuations is also included. Tests were conducted to determine if the A to F stability categories provide a corresponding set of quantitative measures of stability which are distinct from one another. A second set of tests were run to determine whether the Pasquill categories would produce distinct sets of wind azimuth and elevation angle standard deviations. The tests were carried out using two sources of data. The first was the three-hourly surface weather observations at Augusta, Georgia, from which the Pasquill stability category was determined; the second was half-hour average temperatures, wind speeds, wind directions, and standard deviations of wind azimuths and elevation angles, derived from data supplied by Savannah River Laboratories. The results of these tests are shown in tabular form. The data distributions show that in the mean, the categories are established in proper sequence. However, the neutral class, D, does not seem to be an indicator of zero lapse rate of potential temperature.

21527 APTIC NO. 40770

Lyons, Walter A. and Henry S. Cole

FUMIGATION AND PLUME TRAPPING: ASPECTS OF MESOSCALE DISPERSION ON THE SHORES OF LAKE MICHIGAN IN SUMMER DURING PERIODS OF STABLE ONSHORE FLOW. *Preprint, American Meteorological Society, Boston, Mass., p. 42-47, 1971. 7 refs. (Presented at the Conference on Air Pollution Meteorology, Raleigh, N. C., April 5-9, 1971.)*

A study was conducted to determine the effects of plume fumigation and trapping along the shores of Lake Michigan. Of particular interest was the behavior of the plume from a coal burning power plant about 20 km south of Milwaukee. Two days were chosen with generally easterly gradient flow, one of which was sunny, and the other with a dense overcast. Horizontal and vertical temperature measurements and photographs from the ground and aircraft yielded qualitative results. Calculations of sulfur oxides concentrations reinforce these findings. On the first day of testing, the plume from the power plant reached an effective stack height of about 320 m as it flowed westward in the stable layer aloft. When the top of the thermal internal boundary layer (TIBL) intersected the plume, fumigation of smoke down to the surface at a point about 7 km inland was seen. A strong taste and smell of sulfur dioxide was noted at the surface and by the aircraft crew as it penetrated the plume. Significant turbulence diminished after the cessation of insolation. The plume then remained aloft and advected many tens of kilometers inland with little lateral or horizontal dispersion. A dense smoke plume from a very low stack located about 1.7 km inland showed marked looping and diffused rapidly. When the main plume fumigation was occurring, its effective stack height was below the top of the TIBL. Due to the heavy overcast on the second day of testing, no warming occurred as the air flowed onshore. Thus, the power plant plume extended as far as the eye could see, with very little dispersion. However, smoke from the same low stack was trapped within the 135 meters deep lid. It rapidly spread horizontally, but its vertical diffusion was limited by the overlying inversion layer.

21528 APTIC NO. 40321

Marlatt, William E. and James C. Harlan

A STUDY OF THE ATTENUATION BY ATMOSPHERIC PARTICULATES OF THERMAL INFRARED RADIATION. *Michigan Univ., Ann Arbor, Center for Remote Sensing Information and Analysis and Environmental Protection Agency, Washington, D. C., Water Quality Office. Proc. Symp. Remote Sensing Environ., 7th, Ann Arbor, Mich., 1971, vol. 3:1791-1806. 14 refs. (May 17-21.)*

A series of underflight of the Nimbus III satellite were conducted in order to monitor the concentrations of atmospheric particulates and the brightness temperature of the sea surface in Barbados. After computer simulation of the atmospheric attenuation of infrared radiation by molecular atmospheric constituents alone, the calculated values of brightness temperature were compared with the values observed by the aircraft- borne radiometer and the satellite MRIR 10-11 micron bandpass channel. Although the calculated values were within 7% of measured values for a case where very low concentrations of atmospheric aerosols were observed, they differed by nearly 20% for a condition of high concentrations of particulate matter in the atmosphere. The aerosol effect was determined quantitatively to be as significant in infrared remote sensing as low cloud layers. (Author abstract modified)

21529 APTIC NO. 40207

Martinez, J. R., R. A. Nordsieck, and A. Q. Eschenroeder

MORNING VEHICLE-START EFFECTS ON PHOTOCHEMICAL SMOG. *General Research Corp., Santa Barbara, Calif., Air Pollution Control Office, Contract EHSD 71-22, CR-2-191, 42p., June 1971. 24 refs.*

The influence of cold-start vehicle emissions on air quality was investigated using a photochemical/diffusion model. Both the time and space distribution of cold starts were examined. A day from an Oct. 1968 Los Angeles smog episode served as a baseline for determining diffusion coefficients, nitrogen balance, and hydrocarbon reactivities. Vehicular and stationary sources for 1968, 1971, 1974, and 1980 are emission inputs, and pollutant concentrations at the ground are air quality outputs. Stagnant central basin conditions govern the time phasing studies. Emissions introduced during the starting process have the greatest effect of all on carbon monoxide peaks, increasing the peak CO concentration from 9 to 13%. The levels of ozone and nitrogen dioxide that build up later in the day are influenced less because chemical processes afford dilution time. Thus for ozone the increase in concentration due to morning emissions ranges from 1 to 7%, and for NO_2 the range is from 0 to 2%. Typical west-to-east morning air movement forms a background for the geographical distribution studies. If vehicle starts are decentralized geographically, only a slight increase in the pollutant loading is noted because of the low morning wind speeds. This increase almost insignificant compared with the starting emission portion of the total emissions. Based on the results of the study, three possible weighting schemes are proposed for combining cold-start and hot-start driving cycle measurements, each related to morning cold-start emissions. (Author abstract modified)

21530 APTIC NO. 40613

Martinez, J. R., R. A. Nordsieck, and A. Q. Eschenroeder

MORNING VEHICLE START EFFECTS ON PHOTOCHEMICAL SMOG. *General Research Corp., Santa Barbara, Calif., Air Pollution Control Office Contract EHSD 71-22, CR-2-191, 51p., June 1971. 24 refs.*

The influence of cold-start vehicle emissions on air quality was investigated using a photochemical/diffusion model. Both the time and space distribution of cold starts are examined. A day from an October 1968 Los Angeles smog episode serves as a baseline for determining diffusion coefficients, nitrogen balance, and hydrocarbon reactivities. Vehicular and stationary sources for 1968, 1971, 1974, and 1980 are emission inputs, and pollutant concentrations at the ground are air quality outputs. Stagnant central basin conditions govern the time phasing studies. Emissions introduced during the starting process have the greatest effect of all on carbon monoxide peaks, the effect being to increase the peak CO concentration from 9 to 13%. The levels of ozone and nitrogen dioxide that build up later in the day are influenced less because chemical processes afford dilution time. Thus for ozone, the increase in concentration due to morning emissions ranges from 1 to 7% and for nitrogen dioxide the range is from 0 to 2%. Typical west-to-east morning air movement forms a background for the geographical distribution sutdies. If vehicle starts are decentralized geographically, only a slight increase in the pollutant loading is noted because of the low morning wind speeds. This increase is so small as to be insignificant compared with the starting emission portion of the total emissions. Based on the results of the study, three possible weighting schemes are proposed for combining cold-start and hot-start driving cycle measurements, each related to morning cold-start emission. (Author abstract)

21531 APTIC NO. 40551

McCormick, M. P. and W. H. Fuller, Jr.

LIDAR APPLICATIONS TO POLLUTION STUDIES. *Preprint, American Chemical Society, Washington, D. C.; American Inst. of Aeronautics and Astronautics, New York; Environmental Protection Agency, Washington, D. C., Inst. of Electrical and Electronics Engineers, New York; Instrument Society of America, New York; National Aeronautics and Space Administration, Washington, D. C.; and National Oceanic and Atmospheric Administration, Washington, D. C., 15p., 1971. 12 refs. (Presented at the Joint Conference on Sensing of Environmental Pollutants, Palo Alto, Calif., Nov. 8-10, 1971, Paper AIAA 71-1056.)*

The application of lidar (laser radar) techniques using elastic, Raman, and fluorescent scattering air-pollution measurements is examined. The theoretical foundation, data analysis, and equipment design are reviewed. Data showing measurements of the mixing of particulate pollutants in the atmosphere are presented, including simultaneous two-wavelength results; isopleths showing the temporal dynamics of particulate mixing; measurements of the top of the earth s mixing layer; and measurements in a valley with restricted circulation and mixing. All measurements are compared with simultaneous radiosonde and/or aircraft-mounted temperature probe support. In addition, a second generation lidar system presently under development is described. (Author abstract modified)

21532 APTIC NO. 40130

Mikhel, V. M. and G. A. Muromova

STUDYING THE WIND VARIATIONS IN THE LOWER KILOMETER LAYER OF THE ATMOSPHERE. *(Issledovaniye izmenchivosti vetra v nizhnem kilometrovom sloye atmosfery). Text in Russian. Tr. Gl. Geofiz. Observ. (Leningrad), no. 283:102-109, 1971. 22 refs.*

Series of balloon observations of the wind variations in the lower kilometer layer of the atmosphere are described. All balloons were released from the same point, and the observations were limited to 15 min. The wind variations were determined with sufficient accuracy from the angular diameter. Root-mean-square values of the wind speed variations were calculated as a function of time and altitude. The wind variations first increased rapidly and later slowed down again. The curve for the wind speed variations contained a maximum of the speed variations, another maximum of the non-representativeness for about 0.3 km, and the respective minima. The data obtained were analyzed according to the different types of synoptic processes and wind speed gradients, while the relationship between the wind speed variations and the wind speed profile was found to be more important than that between wind speed variations and synoptic conditions. Maximum wind speed variations in atmospheric fronts and minimum variations in anticyclones were determined. High wind speeds resulted in increased vertical wind speed profiles, and following reduced RI values. Root-mean-square values of the wind speed variations as a function of time are given for different initial wind speeds.

21533 APTIC NO. 40382

Moskalenko, N. I.

RADIATION ABSORPTION IN ATMOSPHERIC HN03 SHEETS. *(O pogloshchenii radiatsii v polosakh atmosfernogo HN03). Text in Russian. Izv. Akad. Nauk SSSR, Fiz. Atmosfery i Okeana, 8(2):234-235, 1972. 3 refs.*

In order to obtain a function expressing the spectral absorption of atmospheric nitric acid, experimental data obtained previously from radiation absorption studies of nitric acid and nitrogen mixtures under laboratory conditions are analyzed. The spectral transmission function including empirical parameters computed according to methods described elsewhere, appears to be valid under less than 0.2 atm. pressure conditions. If the pressure is above 0.5 atm, then the spectral transmission function becomes independent of the pressure factor and is described by the absolute product between the absorption coefficient and mass multiplied by the experimental coefficient. Comparison between computed and experimental spectra showed satisfactory agreement. Similar information is useful in the computation of infrared radiation horizons at above 20 km altitudes, in which the contribution of nitric acid vapor of the earth atmosphere appears to be considerable for a series of spectral integrals.

21534 APTIC NO. 40718

Mossop, S. C., R. E. Cottis, and B. M. Bartlett

ICE CRYSTAL CONCENTRATIONS IN CUMULUS AND STRATOCUMULUS CLOUDS. *Quart. J. Roy. Meteorol. Soc. (London), vol. 98:105-123, Jan. 1972. 22 refs.*

A study was conducted to define the cloud conditions under which enhancement of ice crystal concentrations occurs. Ice crystal concentrations of the order of 100/l were found in some of the cumulus clouds sampled on four different days over or near the Australian mainland. These concentrations were 100 to 10,000 times higher than those of the ice nuclei present. The clouds had summit temperatures no colder than -13 C. The clouds were sampled by flying through them at constant altitude in a suitably instrumented aircraft. The instrumentation included a continuous replicator, particle replicas, an aluminum foil impactor, and a Squires cloud droplet gun. Penetration of shallow stratocumulus clouds, with temperatures similar to those of the cumulus clouds, showed that ice particle enhancement was much less important, a factor of 10 being the upper limit. The difference in glaciation behavior is considered in the light of differences in measured drop spectra, the stratocumuli having much narrower drop size distributions than the cumuli. It is believed that the mechanism by which the number of ice crystals is enhanced is the production of secondary ice crystals when ice particles grow by riming. (Author abstract modified)

21535 APTIC NO. 39853

Neuberger, Hans

AIR POLLUTION AND FOG PROPERTIES. *Interdepartmental Committee on Air Pollution, Washington, D. C., Air Pollut., Proc. U. S. Tech. Conf., Washington, D. C., 1950, p. 807-811. 10 refs. (May 3-5, Louis C. McCabe, ed.)*

An experimental investigation was undertaken to determine whether the persistence of fog is generally greater in regions of marked air pollution than in relatively pure country air. The number of condensation nuclei per unit volume was taken as a criterion of air pollution, since a parallelism between the concentration of nuclei and other components of air pollution, such as dust and sulfur content, has generally been observed. Fogs were produced by a 20% expansion of saturated air in a lucite tube of 130 cm length and 3 cm diameter, lined with wet blotting paper. Fog densities were determined by photoelectric measurement of the transmission of a parallel light beam through the fog. The duration of the fogs, timed by means of a tape recorder feeding at a rate of about 20 mm per sec, was determined as the interval between the instant of least transmissibility at the beginning and that of recovery of 100% transmission. Nuclei concentrations were measured by an improved model of the conventional Aitken pocket counter. Concentrations of less than 50 nuclei per cu mm were obtained by passing laboratory or outdoor air through the fog tube; higher concentrations were produced by the blue flame of a Bunsen burner. Light transmission was seen to decrease (i.e., the fog density to increase) significantly with an increase in air pollution only when the air contained less than roughly 100 nuclei per cu mm. With further increase of the nuclei concentration, the fog density was no longer materially affected. By contrast, the fog persistance increased continuously with an increase in the number of nuclei. When the logarithm of the number of nuclei per cu mm was plotted versus the fog duration, this relationship was practically linear. In the second part of the study, air polluted from various sources was passed through a 50 cm tube before fog was subsequently formed. Fogs derived from air from outdoors, laboratory air, flue gases from a slowly burning bed of low volatile bituminous coal in an ordinary domestic furnace, flue gases from a propane gas water heater, and the exhaust gases from an idling engine are considered.

21536 APTIC NO. 40192

Nyberg, A.

SOME NOTES ON THE ACIDITY OF PRECIPITATION. *Idojaras (Budapest), 74(3-4):145-152, May-Aug. 1970. 9 refs.*

There is a great variability in the acidity of yearly precipitation. However, on the basis of observations, there seems to be a general upward trend in the acidity of precipitation in Scandanavia during the last decades. Although pollution is reduced by precipitation, little effect of washing out of acid during a single occasional rain has been observed. Air coming directly from the Atlantic gives precipitation which often, but not always, is less acid than air coming from central of Eastern-Europe. From observations of corrosion in several places in Sweden during two different periods, the total increase in the background pollution of sulfur dioxide in Sweden during the last three decades amounts to about 1% per year, whereas in the big industrial cities the increase amounts to 5% or more. This indicates that the local sources of SO2 are of greater importance than distant sources. (Author summary modified)

21537 APTIC NO. 40493

Ogden, T. L.

THE EFFECT OF RAINFALL ON A LARGE STEELWORKS. *J. Appl. Meteorol., 8(4):585-591, Aug. 1969. 8 refs.*

Port Kembla Steelworks, on the New South Wales coast, is the tenth largest integrated iron and steelworks in the western world. About 60% of production is made by the oxygen process. Electrostatic precipitators remove 99% of its effluent fume. Solids might total several tens of kg/hr. Relative to background, it output of freezing nuclei (at 15.8 C) is probably negligible, but its output of condensation nuclei is high, and the outputs of heat and water vapor are appreciable. There are about 90 rainfall stations within 100 km of the plant which were operating 15 yrs before steelmaking began. When extraneous effects are allowed for the records show no influence of the steelworks greater than 5% on total rainfall, summer rain (when on shore winds predominate), or light rain. The effect of the Chicago industrial complex on precipitation caused changes in other variables, but was apparently evident in changes in total precipitation readings. The dates and nature of the changes in this variable make the industrial effect an unlikely explanation. This study does not show that the plant never effects rainfall in any particular weather situation but that any such occasional effects have no measurable influence on annual totals. (Author abstract modified)

21538 APTIC NO. 40701

Osipova, G. I.

CLOUD FORMATION AS RELATED TO HUMIDITY AND ITS TRANSFER IN THE ATMOSPHERE. *(Razvitiye oblachnosti v svyazi s vlagosoderzhaniyem i perenosami vlagi v atmosfere). Text in Russian. Tr Gl. Geofiz. Observ. (Leningrad), no. 262:163-178, 1971. 5 refs.*

The relationships between cloud formation and atmospheric humidity characteristics such as humidity content, total dew point deficit, and atmospheric humidity transfer were studied, and the general features of the dependence of these characteristics on synoptic conditions were determined. Days with uniform cloud gradations and similar origin of clouds were also similar to each other in the characteristics of the atmospheric humidity. Cloud formation was determined by these humidity characteristics as well as by conditions favoring the formation of vertical currents. Little if any cloud formation (maximum, two) was observed in the case of low humidity content (up to 15 kg/sq m), high total dew point deficit (30-60 deg) at 850-, 700-, and 500-millibar levels, or when humidity transfer was below 150-kg/m sec. Clouds 3/3-5/5 formed within masses and frontally as well. Such clouds inside masses were observed at total dew point deficits of 30-50 deg, humidity contents below 20 kg/sq m, and humidity transfer below 150 kg/m sec. Frontal cloud formation (3/3 to 5/5) was usually found with dew point deficits below 25 deg, humidity content above 20 kg/sq m. and below humidity transfer 150 kg/m sec. The formation of clouds 6/6-10/10 was observed inside masses and at fronts alike, while the formation inside masses usually required conditions such as dew point deficit above 25 deg in a dry year and below 25 deg in a humid year, humidity content below 20 kg/sq m, and humidity transfer below 150 kg/m sec. Such clouds produced precipitations on one-third of all days. The frontal formation of clouds 6/6-10/10 was observed at dew point deficits below 20 deg, high humidity content, and high humidity transfer (150-300 kg/m sec). Precipitations from such clouds were obtained on two-thirds and one-half of all days investigated in humid and dry years, respectively. Frontal cloud formation at the rear end of low-pressure zones was observed even under such conditions as low dew point deficit, 15-25 kg/sq m humidity content, and 60-280 kg/m sec humidity transfer.

21539 APTIC NO. 40369

Ottar, B.

ACID PRECIPITATIONS IN SCANDINAVIA. *(Saure Niederschlaege in Skandinavien). Text in German. Umschau (Frankfurt), 72(9):290-291, May 1972. 10 refs.*

The increase of atmospheric pollution by sulfur oxides is reflected in pH values measured in precipitation and rivers. Acidity has already exterminated trout and salmon in many locations in south Norway and is considered a threat to forestry in the area. Chemical analyses revealed that the acid most frequently found in precipitation is sulfuric acid, accompanied by steadily increasing amounts of soot and ash. Measurements of the sulfur concentration at 20 different points indicate a certain regular fluctuation. For several days only a few micrograms of sulfur in the form of sulfur trioxide were measured in the aerosol of the atmosphere at all points. Then the values rose to 10 to 20 micrograms for several days, after which they returned to the original lower value. This fluctuation coincided with a high pressure zone over central Europe with weak winds and a ground inversion which persisted during the day. For several days air pollutants accumulate in the lower part of the atmosphere. With the eastward movement of the high pressure zone the pollutants are transported across the North Sea to Scandinavia where they are washed out with the precipitation. On the way the largest part of the sulfur dioxide is converted to H2SO4. Analysis of the meteorologic data reveals that similar atmospheric conditions exist about 10 to 20 times per year.

21540 APTIC NO. 40512

Parton, William J. and Amos Eddy

A NUMERICAL MODEL OF HUMAN POPULATION DYNAMICS INFLUENCED BY A POLLUTED ENVIRONMENT. *Preprint, American Meteorological Society, Boston, Mass., p 248-252, 1970. 3 refs. (Presented at the National Conference on Weather Modification, 2nd, Santa Barbara, Calif., April 6-9, 1970.)*

A numerical model of the urban-rural ecosystem has been formulated with the objective of simulating interactions between the various segments of the total ecosystem. A decision making executive routines coordinates the interactions between five submodels, comprising an atmospheric model, hydrology model, city model, zoology model, and botany model. The atmospheric model must predict variations in the weather for periods of time up to 30 years. The parameters predicted include: wind speed and direction, rainfall, relative humidity, cloud cover, temperature, radiation, and air pollution. Air pollution is determined at any point in the field by considering the dispersion from multiple point sources. The model suggested by Pasquill and modified by Gifford is used to estimate pollution concentrations as a function of distance from the point sources. This model uses the wind direction and speed, stability, and solar angle to predict the pollution dispersion. The atmospheric model has provisions for modifying the rainfall frequency and intensity as a function of air pollution and heat island effect. There are also provisions to simulate the effect of artificial weather modifications on the whole ecosystem. The parameters predicted by the hydrology model include: evaporation of water from soil and lake surface, storm runoff, soil moisture, lake level, water pollution, and river hydrograph. The urban model is primarily concerned with population dynamics of the city. The zoology model consists of man and dairy and beef cattle as consumers. The growth of grass, alfalfa, and wheat are included in the botany model. Future work on this model will be directed toward increasing the realism in the ecosystem components.

21541 APTIC NO. 40367

Peckham, Cyril G.

A SUMMARY OF ATMOSPHERIC TURBULENCE RECORDED BY NATO AIRCRAFT. *Technology Inc., Dayton, Ohio, Advisory Group for Aerospace Research and Development Contract AGARD-OTAN-SMP-67-68, Rept. 586, 133p., Sept. 1971. 33 refs.*

NTIS: AD 731152

The 150,000 hours of turbulence data collected from seven participating NATO countries, the instruments used to measure the data, and the methods of processing the data and of separating the turbulence data from the maneuver data, are discussed. In addition, the spectral density methods used to derive gust velocities by altitude are discussed. Turbulence measurements are presented graphically for various altitudes, air speeds, and seasons.

21542 APTIC NO. 40657

Pressman, A. Ya. and Yu. Z. Sominskiy

ON THE PRECIPITATION OF HETEROGENEOUS MIXTURES FROM ATMOSPHERIC SOURCES. *(O* *vypadenii neodnorodnykh primesey iz atmosfernykh istochnikov). Text in Russian. Dokl. Akad. Nauk SSSR, 200(5): 1084-1087, 1971. 4 refs.*

A mathematical description is given of the precipitation of polydispersed mixtures of various degrees of heterogeneity from atmospheric sources. Care should be used when applying the classical formulae for the diffusion of monodispersed mixtures to not fully homogeneous mixtures. Formula are given for the precipitation of mixtures of a high degree of homogeneity from small and great altitudes with low rate of precipitation for the main fraction, as well as for the precipitation of mixtures of various degrees of final heterogeneity at high rates of precipitation and from various altitudes, and for heterogeneous mixtures precipitating from fairly high altitudes at any possible final speed.

21543 APTIC NO. 40573

Raschka, G. J.

REPORT ON A STUDY OF THE CONTRIBUTION MADE BY THE GREAT NORTHERN OIL COMPANY REFINERY TO THE AIR POLLUTION PROBLEM IN ST. PAUL. *Minnesota Dept. of Health, Minneapolis, Section of Radiation and Occupational Health, 16p., Oct. 21, 1958.*

The contribution of an oil refinery located 10 or 12 mi from St. Paul, Minn., to air pollution in that city was investigated. An odor survey was conducted to measure public reaction to odors emanating from the refinery area. Plant operation was inspected. By-product sulfur recovery was not as complete as design specifications predicted and addition to the plant was made for the conversion of high boiling thiophenols to recoverable sulfur compounds. Meteorologic factors were evaluated, based on the local Weather Bureau, and possible topographic effects are noted. Results of the study indicate that the refinery can contribute to the air pollution problem in St. Paul at repeated but infrequent intervals. The opinion expressed by several people that odor episodes originating at the refinery are less frequent and intense may reflect on actual reduction in odor output or may only indicate that the proper combination of weather conditions occurred less frequently. The present odorous discharges do not appear to create a serious health hazard in St. Paul, although further documentation on effects to persons and property should be obtained.

21544 APTIC NO. 40123

Reiter, Reinhold

VARIATION OF THE DEGREE OF DISPERSION OF FALLOUT-LABELED AEROSOL PARTICLES IN THE LOWER TROPOSPHERE (BETWEEN 700 AND 3000 M) WITH THE NATURE OF THE PARTICLE AND WITH THE EXCHANGE INTENSITY. *(Abhaengigkeit des Dispersionsgrades der mit RaB bzw. fallout beladenen Aerosolpartikel in der unteren Troposphaere zwischen 700 und 3000 m NN von Luftkoerpertyp und Austauschintensitaet). Text in German. Pure Appl. Geophys. (Basel), 83(6):158-166, 1971. 17 refs.*

A double aerosol filter method was used in order to gain relative values which characterize the existing type of size distribution of the atmospheric aerosol particles; labeled by natural or fallout radioactivity. Continuous measurements were carried out simultaneously at 0.7, 1.8, and 3 km altitude since Dec. 1963. Concerning natural (RaB) radioactivity, the minimum of aerosol particle size was in tropical maritime air, its maximum in polar maritime and polar air masses. In the case of fallout radioactivity, the minimum of particle size was in tropical, the maximum in continental air. With increasing altitude, the mean size of the fallout particles decreases obviously. The size distribution of the aerosol particles, labeled by RaB radioactivity, is a function of vertical mass exchange intensity. The pattern of this function depends strongly on altitude. (Author summary)

21545 APTIC NO. 40179

Reiter, Reinhold, R. Sladkovic, and W. Carnuth

ON FINE STRUCTURE AND CONTROL OF VERTICAL AEROSOL EXCHANGE BETWEEN 700 M AND 3000 M. *Arch. Meteorol. Geophys. Bioklimatol., Ser. A. (Vienna), 20(2):115-157, 1971. 37 refs.*

Telemetry systems permit, by means of cable cars, the recording in a routine manner, of the profiles of temperature, humidity, wind, air conductivity, and potential gradient, against pressure as a parameter of altitude up to 3000 m a.s.l. From the profiles of air conductivity, the vertical mass exchange coefficient can be calculated as a function of altitude (in small incremental intervals). The following factors enter into the computation: the ion production rate as a function of altitude, the concentration of Aitken nuclei, and the coagulation rate in the Aitken nuclei particle size range. Examples demonstrate the effectiveness of the method: control of the vertical aerosol exchange through several single and multiple temperature layers situated at various altitudes, their fine structure being related to the fine structure of the altitude dependence of the exchange coefficient; structure of the upper boundary of the exchange layer in relation to aerosol transport and aerological structure; action of wind shear upon aerosol transport. The measured data are statistically evaluated from various aspects.

21546 APTIC NO. 40193

Reiter, R., R. Sladkovic, K. Poetzl, W. Carnuth, and H. -J. Kanter

STUDIES ON THE INFLUX OF STRATOSPHERIC AIR INTO THE LOWER TROPOSPHERE USING COSMIC-RAY PRODUCED RADIONUCLIDES AND FALLOUT. *Arch. Meteorol. Geophys. Bioklimatol., Ser. A. (Vienna), 20(3):211-246, 1971. 53 refs.*

A procedure permitting continuous detailed study of the air mass exchange between stratosphere and troposphere is discussed. At the Zugspitze (2964 m a.s.l.), since 10.11 1969, daily aerosol samples from 2000 Cu m each were accumulated on membrane filters, over a period of 24 hours in each case. From these radionuclides and some fallout elements predominantly originating from the stratosphere were chemically separated. Their concentration was determined by beta or gamma spectrometry. By comparing the variation of these values with time, against the development of the weather at tropopause level and inside the troposphere, it is possible, with the aid of coarse analysis, to draw conclusions as to the exchange processes between stratosphere and troposphere as well as the trajectories of the radioactive matter. Detailed results were obtained by means of isentropic trajectory analysis. The latter were based upon the radiosonde ascents of the area of the Atlantic Ocean and Europe. Performance of this fine analysis is demonstrated by an example. The results of the investigations are in good agreement with the results of other investigations. The continuity of the daily measurements as well as the employment of computers permits the quantitative determination and continuous observation of the air mass exchange between stratosphere and troposphere and the fine structure of the stratospheric-tropospheric exchange mechanism.

21547 APTIC NO. 39875

Rodebush, Worth H.

AEROSOLS IN THE ATMOSPHERE. *Interdepartmental Committee on Air Pollution, Washington, D. C., Air Pollut., Proc. U. S. Tech. Conf., Washington, D. C., 1950, p. 243-247. (May 3-5, Louis C. McCabe, ed.)*

The general properties and stability of fogs (particle size range 10-50 micron diameter), dusts, and smokes (1 micron diameter) are briefly reviewed. Atmospheric aerosols can also be classified by behavior: inertial particles (radius greater than 1 micron) fall steadily under the influence of gravity, while particles smaller than 1 micron show Brownian motion, giving them diffusivity. Electrial and optical properties, polarization forces, and coagulation and charge separation are discussed. The atmospheric property significant for convective stability is density; atmospheric aerosols apparently have the same density as the atmosphere and show the same meteorologic behavior. Removal of aerosols from the atmosphere by filtration is considered for inertial and mobile particles.

21548 APTIC NO. 40418

Rotta, Nicholas R.

THE STABILITY OF A VORTEX PAIR IN THE PRESENCE OF A GROUND PLANE. *Oceanics, Inc., Plainview, N. Y., Air Force Office of Scientific Research Contract F44620-70-C-0106, Rept. 71-81A, AFOSR-TR-71-2486, 46p., June 1971. 18 refs.*

NTIS: AD 732473

The configuration stability of a vortex pair in the presence of a ground plane is examined. First the motion of a vortex in three dimensions is examined by the method of matched asymptotic expansions in which the solution of the Navier-Stokes equations are constructed asymptotically. The dependence of the velocity and stability of the vortex on factors such as the outer (inviscid) flow field and viscosity in the inner (vortical core) region is clearly established. In contrast to previous stability studies, the method employed here avoids the singularity encountered using only inviscid equations of motion, and thereby renders the use of ad hoc arguments or ambiguous assumptions unnecessary. The proximity of the ground plane enters through the outer solution which is matched to the inner, viscosity dependent, solution. Apart from the diffusion of vorticity which is a measure of the size of the core region and of vortex age (a factor in the stability), the distribution of vorticity in the core determines an inviscid-viscous interaction on the motion and stability of the vortex configuration. The vortex pair in ground effect is unstable to small disturbances; this instability has an increasing amplification rate as the ground is approached. The explicit dependence of the stability on the perturbation wavelength is discussed and illustrated. The comparison of this analysis, in which viscous effects are systematically included, with an inviscid analysis is not clearly established; however, indications are that the present analysis predicts a more stable (less unstable) vortex system than does the inviscid theory. Comparison of the present analysis in the limit of zero ground effect with photographs of vortices undergoing a configuration instability is made. The viscosity necessary for agreement is found to be on the order of the eddy viscosity for the turbulent line vortex, indicating the existence of turbulence in the vortex core. (Author abstract)

21549 APTIC NO. 40813

Ruhnke, Lothar H.

FOG DROPLET SIZES AT THE PANAMA CANAL. *National Oceanic and Atmospheric Administration, Boulder, Colo., Environmental Research Labs., NOAA TR ERL 209-APCL 22, 18p., May 1971. 7 refs.*

GPO: 0317-0037

Data on fog droplet spectra and condensation nuclei concentrations at the Panama Canal were collected using an impactor and a portable counter. Mass median diameter of fog droplets was 21 micron. Nuclei concentrations varied within 500-5000 particles per/cu cm. Contaminated air from pollution sources in the neighborhood produced several plumes crossing the canal. The greatest influence was a large ship exhausting 30,000 particles/cu cm over a 1-mile stretch. Fog density and visibility were computed. A high frequency of persistent meteorological conditions for radiation fog, low wind, and a thin fog layer make this area a good testing ground for warm fog modification concepts. (Author abstract modified)

21550 APTIC NO. 40535

Ruscheweyh, Hans

STUDY OF THE FLUE GAS EMISSION IN THE VICINITY OF A POWER PLANT IN A WIND TUNNEL. *(Rauchgasimmission im Einwirkbereich eines Kraftwerkes, untersucht an einem Windkanalmodell). Text in German. Staub, Reinhaltung Luft, 32(5):202-209, May 1972. 16 refs.*

In a wind tunnel test, flue gas concentrations were measured at ground level in the range affected by a power station. A smoke probing method and carbon dioxide analysis were used. In a smoke machine special oil with CO2 was pressed through a heater and expanded to atmospheric pressure. A dense white mist developed which slowly disintegrated after 10 sec. This mist was injected into the feed-line to the stacks by means of compressed air. The stack exit speed of 17.5 m/sec was achieved by a blower. For better mixing, the smoke-air-mixture tangentially entered a wind chamber and left centrally for a distributor to the four stacks. A control probe was installed in the feed-line to the first stack. The smoke probe contained a photo resistor which was irradiated by a lamp. The radiation path crossed a tube through which the flue gas-air-mixture was passed. Through the extinction, the electric resistance of the photo resistor was changed. This change was converted into an electric signal which was amplified and recorded. The concentrations varied according to wind direction and velocity. The values obtained with the CO2 method were in good agreement with those obtained by the smoke probing method.

21551 APTIC NO. 40025

Schweigart, H. A.

THE END OF LIVING. *Protectio Vitae, no 1:2-3, Feb. 1972. (Presented at the Freiheitlichen Akademiker, University of Vienna, Austria, Nov. 12, 1971.)*

The oxygen and carbon dioxide balance will be the principal biopolitical problem of the future. From the year 2150 on, the production of oxygen by photosynthesis will not suffice for a world population which will by them have risen to 90 billion. Reduction of the oxygen concentration of the atmosphere by 10% would drastically alter soil, water, plants, animals, and humans. The surplus of CO2 in the troposphere now amounts to 0.2%. By combustion of the 400 billion tons of fossil fuels still available this surplus would reach catastrophic proportions, and the resulting tropospheric warming would melt the ice in the polar regions. The rise of sea level caused by the melting ice would flood large land masses. An increase of the population to 198 billion would raise the CO2 content by 7.5 billion tons, which again would lead to a total break down of living conditions. Complete text unavailable.

21552 APTIC NO. 40522

Shah, G. M.

LUNAR INFLUENCE ON ATMOSPHERIC OZONE. *Nature (London), 237(5353);275, June 2, 1972. 9 refs.*

Evidence is presented for a lunar influence on different geophysical data. The data for atmospheric ozone from 12 stations, six from each hemisphere, was analyzed and the results are reported. A list of stations, their geographic coordinates, and the period of record are presented in tabular form. Ozone data for each of the stations are arranged according to the lunar days for the entire period of study. The values for the same lunar day are averaged over different lunations. The departures of these averages from the lunar monthly mean are divided by their standard deviations, and the ratios have been subjected to harmonic analyses so that amplitudes and phases of different harmonics are determined. This has revealed two major periodicities, with periods of semi-lunar month and lunar month. The semi-lunar component of the ozone cycle gives maxima near the new moon and the full moon at all of the stations except three, where maxima occur around the first and the last lunar quarters. No systematic variation with latitude of either amplitude or phase of these two oscillations is evident. Most of the variance can be explained by these two variants alone.

21553 APTIC NO. 40695

Shchelchkov, G. I.

AUTOMATIC PROCESSING OF FOG MICROSTRUCTURE MEASUREMENT DATA. *(Avtomatizatsiya obrabotki izmereniy mikrostruktury tumana). Text in Russian. Tr. Inst. Eksp. Meteorol., no. 20:95-99, 1971. 3 refs.*

A modern automatic data recording system, developed for the Aelita photoelectric for microstructure (concentration and size distribution spectra of fog drops) measuring units, is described. The automatic unit permits the recording of intense data flows, which is particularly important for studies of microphysical parameter fluctuations. Three optional recordings are possible: recording on punch tape, on paper tape in digit form, and a combination of the two above methods. The latter option, where the data are first punched on punch tape, and then, initiated by an automatic switch, on the machine tape, is provided for low data frequency.

21554 APTIC NO. 40450

Shiozawa, Kiyoshige, Atsushi Ootaki, and Shinichi Okamoto

STUDIES ON THE PREDICTION OF AIR POLLUTANTS CONCENTRATION (II). RELATIONSHIP BETWEEN POLLUTANTS CONCENTRATION AND METEOROLOGICAL FACTORS. *(Taiki osen busshitsu nodo no yosoku ni kansuru kisoteki kenkyu (II) --Osen nodo to kisyo yoso no kankei--). Text in Japanese. Bull. Sci. Eng. Res. Lab. (Tokyo), no. 54:60-72, 1971. 4 refs.*

It has previously been reported that an Air Pollution Index based on the principle component analysis indicates that air pollution in Japan, especially in Tokyo, is closely related to air pressure patterns. Results of an investigation conducted to quantitatively determine the relationship between air pollution and meteorological conditions indicate that pollution is related to air pressure, vapor pressure, relative humidity, dew point temperature, and south wind direction. The canonical correlation coefficients are 0.84 in winter and 0.92 in spring. Many cases of high concentrations are related to a southerly wind direction, since the pollutants are not diffused and flow into the Tokyo district from the Keihin and the Keiyo industrial areas. Based on the canonical variants, corresponding to canonical correlation coefficients, it is concluded that air pollution is related to air pressure patterns around the Japanese Islands. (Author abstract modified)

21555 APTIC NO. 40662

Simonov, V. V. and G. T. Nikandrova

EVALUATION OF THE ENERGY EXPENDITURE IN FOG DISSIPATION PERFORMED ABOVE AN ARTIFICIALLY HEATED BELT. *(Otsenki energeticheskikh zatrat pri rasseyanii tumana nad iskusstvenno nagretoy polosoy). Text in Russian. Tr. Gl. Geofiz. Observ. (Leningrad), no. 262:70-79, 1971. 5 refs.*

The energy expenditure for artificial fog dissipation above heated belts as a function of meteorologic parameters, belt length, and heater arrangement was calculated. Heat transfer occurrs mainly by turbulence, while horizontal diffusion plays a negligible role. As the case of water vapor-producing burners was eliminated, temperature variations alone were supposed to occur. Thermal balance equations are derived for fog area and for the area where the fog is dissipated. The linear equations obtained for heat and humidity transfer permit the determination of the necessary energy expenditure as a function of wind velocity, turbulence coefficient, air temperature, and fog water content, as well as that of the optimum heater arrangement. An investigation of three different heater arrangements (soil surface temperature constant, linearly increasing, or linearly decreasing along the belt) revealed the latter solution to be most economical. While the proper choice of the belt length is of great importance, lengths far above the minimum requirement may be favorable. As the necessary energy expenditure is strongly affected by the turbulence coefficient, the latter should be increased to minimize heat losses, using a certain proportion of the thermal energy for this purpose. The total energy expenditure is also influenced by the height of the dissipation. A turbulence coefficient of 0.10 m should be applied for surface-layer fogs of about 10 m, while fogs above 60 m require increased values.

21556 APTIC NO. 40693

Smirnov, V. V.

SOME ELECTRIC FEATURES OF THE ENVIRONMENT OCCURRING IN AEROSOL GENERATING CHAMBERS. *(O nekotorykh elektricheskikh kharakteristikakh sredy v aerozol noy kamere). Text in Russian. Tr. Inst. Eksp. Meteorol., no. 20:52-60, 1971. 15 refs.*

Preliminary results of experiments on the electrical characteristics of the environment during artificial fog formation and dissipation are described. Temperature, humidity, fog microstructure, polar conductivity and charge density were measured. A change of 15-20% in the relative humidity caused changes of nearly 100% and more than 30% in the visibility and the conductivity, respectively. Considerable decreases in the conductivity of the air prior to fog formation was observed. The polar conductivity ranged from 0.01 to 0.1 of one quadrillionth per Ohm. cm with unipolarity coefficients of 1-1.25. Reduced conductivity with increased relative humidity above 75% was found. The rate of decrease in the negative conductivity was 1.4 times higher than that in the positive conductivity during fog formation. Negative charge during fog formation was observed. The negative charge reached its maximum when the water content was maximum, and switched to positive when the condensation nuclei recovered their original size. Prevalent increase in the negative conductivity during fog dissipation, and prevalent increase in positive conductivity during the evaporation of the water from the condensation nuclei, were observed.

21557 APTIC NO. 40428

Smithson, H. K., L. L. Price, and D. L. Whitfield

WIND TUNNEL TESTING OF INTERACTIONS OF HIGH ALTITUDE ROCKET PLUMES WITH THE FREE STREAM. *ARO, Inc., Arnold Air Force Station, Tenn., Air Force Rocket Propulsion Labs. Contract F 40600-72 C-0003, Program Element 62302F, ARO Proj. VT 0030, ARO Proj. VQO145, AEDC-TR-71-118, ARO-VKF-TR-71-41, 430p., Sept. 1971. 2 refs.*

NTIS; DDC: AD 731141

Interactions of model rocket plumes and the free stream at varying simulated altitudes were investigated in an altitude simulation chamber. Descriptions of the model rocket nozzles, instrumentation, and data gathering techniques along with calibration data for wind tunnel nozzles are presented. Free-stream variables were Mach number, gas, total temperature, and total pressure. Model rocket parameter variables were exhaust gas, area ratio, chamber total pressure, total temperature, and the orientation of the model relative to the free stream. In addition to pitot probe measurements, plume photographs and density measurements were obtained using the electron beam technique. A fairly large volume of plume and free-stream interaction data was obtained and the results presented in a form useful for further analysis. Plume-pitot data obtained were not corrected for viscous effects; the uncertainty owing to this lack of correction was generally on the order of 1% in such data, with possible increases to the order of 10% for the lowest impact pressures. A plume boundry jump for the alpha equal to 180 degrees model orientation was an unexpected phenomenon. This jump was attributed to condensation in the highly expanded and cooled exhaust gas.

21558 APTIC NO. 40373

Sodergren, A.

CHLORINATED HYDROCARBON RESIDUES IN AIRBORNE FALLOUT. *Nature (London), 236(5347):395-397, April 21, 1972. 7 refs.*

In an analysis of the input and output of chlorinated hydrocarbon residues in a freshwater ecosystem in south Sweden, the amount entering the study area by means of precipitation and by airborne particles was estimated. Fallout was trapped on a 200-micron nylon net and, after collection, the nets were washed in Soxhlet extractors with n-hexane. An aliquot of the extract was injected on a gas chromatograph with electron capture detectors, and the relative retention times were estimated and compared with retention times of known substances. Identity of the more important peaks in the chromatograms was confirmed by chemical methods. The relative frequency of wind directions shows that the study area is subjected to airborne material originating from industries along the Swedish west coast and in the Copenhagen area, as well as from heavily industrialized districts in West Germany. Differences in concentrations of chlorinated hydrocarbon between the various measuring stations are considered, as well as the origin and transport of the chlorinated hydrocarbons.

21559 APTIC NO. 40157

Stalevich, D. D. and T. S. Uchevatkina

ICE FORMING REAGENT EXPENDITURE CRITERIA IN GENERATING ARTIFICIAL PRECIPITATION FROM CONVECTIVE CLOUDS. *(Normy raskhodov ldoobrazuyushchikh reagentov pri iskusstvennom vyzyvanii osadkov iz konvektivnykh oblakov). Text in Russian. Tr. Gl. Geofiz. Observ. (Moscow), no. 262:43-53, 1971. 7 refs.*

Theoretical determinations of optimum ice forming reagent expenditures are described and compared with actual expenditures as applied in experiments. The amount of the precipitation is primarily determined by the reagent expenditure; cloud size and water content are factors of secondary importance. The optimum expenditures for three different ice forming reagents (silver iodide, lead iodide, and copper sulfide) as a function of cloud size, water content, and temperature were determined by conversion from data obtained for a theoretical reagent with an ice forming activity of 1 trillion particles/g. Clouds below 2.0 km, above 4.0 km and those overcooled were not considered. The optimum AgI expenditure was about 1 g for rather super cooled, and about 10 kg for clouds with temperatures close to the specific threshold. The optimum expenditure for PbI2 lay within a range of 40-100 g, while the optimum for copper sulfide for -4 C and temperatures below 8 C were 1 kg and a maximum of 100 g, respectively. The results of the theoretical calculations were in good accordance with experimental data. No precipitation was obtained in experiments where the ratio of the actual to the optimum expenditure was under 0.25, and expenditures far above the optimum level caused only a slight increase in the amount of the precipitation. The above results suggest the good applicability of theoretical optimum values in experiments.

21560 APTIC NO. 40250

Stephens, Edgar R. and Monty A. Price

COMPARISON OF SYNTHETIC AND SMOG AEROSOLS. *J. Colloid Interface Sci., 39(1):272-286, April 1972. 20 refs.*

Aerosols resembling those observed in polluted air have been generated photochemically in several laboratories in the past 15 years. But the importance of such mechanisms in real polluted air in comparison with aerosols emitted directly from sources has not been easy to evaluate. An optical particle counter and a technique for obtaining infrared spectra of aerosols have now been used to compare these synthetic laboratory aerosols with smog aerosols from the Riverside, California area. The dirty air conditions studied were photochemical smog, dust storm, and orchard heater smoke. The clean air conditions examined were rainstorm, Santa Ana wind, and morning radiation inversion. Aerosol generated photochemically appears to account for most of the visibility loss in smog which is due to particles in the 0.3-1.0 micron diameter range. This portion of the aerosol can be accounted for as sulfuric acid, and auto exhaust alone is sufficient to account for it if the sulfur in gasoline is oxidized to sulfuric acid efficiently. Infrared analysis shows sulfate bands and additional bands which are ascribed to a nitrate. Particles larger than 1 or 2 micron may account for much of the weight of particulate matter but not much of the visibility loss. Many of these are solid in contrast to the smaller particles which appear to be liquid. Sandstorm aerosols are much larger in size while orchard heater smoke looks like particulate carbon and has no infrared bands. (Author abstract)

21561 APTIC NO. 40125

Stone, E. J. and E. C. Zipf

ELECTRON-IMPACT EXCITATION OF NITRIC OXIDE. *J. Chem. Phys., 56(6):2870-2874, March 15, 1972. 18 refs.*

A laboratory study of the vacuum ultraviolet emission features which can be excited by electron impact on nitric oxide was undertaken. The absolute excitation cross sections for the principal molecular and atomic emission features in the wavelength region 1100 to 1700 A that are produced in this manner were measured, including the NO positive Baer-Miescher bands, two NO beta prime bands, and several atomic nitrogen multiplets. The variation of the dipole transition for another NO positive band system was also determined. These results permit a critical assessment of the role of NO as a source of ultraviolet photons in an auroral display.

21562 APTIC NO. 39852

Sutton, O. G.

THE PROBLEM OF DISPERSION OF HOT GASES IN THE ATMOSPHERE. *Interdepartmental Committee on Air Pollution, Washington, D. C., Air Pollut., Proc. U. S. Tech. Conf., Washington, D. C., 1950, p. 793-801. 5 refs. (May 3-5, Louis C. McCabe, ed.)*

The difference between the temperature of the gas in the stack and that of the ambient air can be a weighty factor in the determination of ground concentrations. A combination of high stacks and high effluent temperature may do much to relieve the lot of those living in the neighborhood of a source of gaseous pollution. The dynamics of a jet of hot gas in a gravitational field is bound to be difficult because of the ir[illegible]bility of the motion, but if certain limitations are accepted [illegible] problem can be treated by semi-empirical methods. The present treatment follows previous work in the basic assumption that the entrainment process implied in the formation of a vertical jet involves turbulence of the usual dynamic type, whose effects can be expressed by means of a suitable mixing-length, but departs from the previous solution in other ways. The solution given here are based on the conception that, if temperature differences are not too large, the spread of a stream of hot gas must bear a close resemblance to the diffusion of a cloud of cold smoke in the atmosphere, the fundamental difference between the two being that in the convection problem the wind is the velocity of natural convection and therefore decays to zero with the excess temperature in the jet. A mechanism of entrainment and a continuous point source expression are given. Results of the analysis include the variation of the central temperature difference with distance from sources; variation of the radius of the jet with distance from the source; variation of the mean temperature difference with distance from the source; shape of the cross-jet temperature profile; variation of velocity at center of jet with distance from the source; and absolute values deduced from meteorologic data. The theory is then applied to a typical refinery steam boiler.

21563 APTIC NO. 40669

Voyt, F. Ya., Ye. Ye. Korniyenko, and S. B. Khusid

ON THE STATISTICAL CHARACTERISTICS OF VERTICAL MOTIONS IN CONVECTIVE CLOUDS. *(O statisticheskikh kharakteristikakh struktury vertikal nykh dvizheniy v kuchevykh oblakakh). Text in Russian. Izv. Akad. Nauk SSSR, Fiz. Atmosfery i Okeana, 7(11):1206-1208, 1971. 10 refs.*

Data on the structure of vertical motion in convective clouds with vertical dimensions ranging from 1 to 3 km are presented. A formula for the spectral density of the vertical velocity is given. Each cloud investigated was divided into five layers of equal vertical dimension. The spectra of the vertical velocities for clouds with different vertical dimensions were of the same type, with spectral density decreasing with altitude within the clouds. Therefore, the spectra were averaged for the lower and upper parts of the cloud, corresponding to 2/5 and 3/5 of the vertical dimension, respectively. The spectral density was dependent on the frequency. The contributions of turbulent and ordered motions to the total energy in convective clouds was equal. The arithmetic means of the fluctuations in the vertical velocity increased with the height to reach their maxima in the top part of the cloud. The dissipation rates of the turbulent energy, computed on the basis of spectral sections corresponding to the inertia interval, ranged from 300 to 700 sq cm/cu sec in most of the height of the clouds.

21564 APTIC NO. 40033

Warner, J.

SMOKE FROM SUGAR-CANE FIRES AND RAINFALL. *Commonwealth Scientific and Industrial Research Organization (Australia), Int. Conf. Weather Modification, Proc., Canberra, Australia, 1971, p. 191-192. 2 refs. (Sept. 6-11.)*

The North Queensland area of Australia was studied to investigate the relationship between rainfall and cane-production, and the suggestion that changes in rainfall were due to the smoke produced on burning the cane leaf and trash. Data on precipitation rates, cloud formation, and incidences of cane fires were examined. While there was a large scatter in rainfall and rainfall ratio values, no consistent trend was detectable. Uncertainty regarding wind direction and lack of good controls inhibited the possibility of detecting any effect of the cane smoke fires upon rainfall. ½

21565 APTIC NO. 39967

Westley, Francis

A BIBLIOGRAPHY OF KINETIC DATA ON GAS PHASE REACTIONS OF NITROGEN, OXYGEN, AND NITROGEN OXIDES. *National Bureau of Standards, Washington, D. C., Chemical Kinetics Information Center, NBS-OSRDB-71-2, 140p., Aug. 1971. 965 refs.*

NTIS: COM-71-00841

A bibliography of references to published papers and reports containing rate data for reactions of the gas phase species of nitrogen and oxygen, their ions, N3, nitrous oxide, nitrogen peroxide, nitrous anhydride, nitrogen tetraoxide, nitric anhydride, nitric oxide, nitrogen dioxide, nitrogen trioxide, nitrogen tetroxide, and ozone, with each other is presented. The material is presented in two ways: by reaction, listing each pertinent article, and in a general reference list, and arranged alphabetically by first author. The criterion for inclusion of an article is that there must be some new information on the reaction, when the article in question is compared with the chronologically preceding ones. In addition, two lists of critical reviews dealing with the above reactions are included.

21566 APTIC NO. 40451

Wippermann, F.

UNIVERSAL PROFILES IN THE BAROTROPIC PLANETARY BOUNDARY LAYER. *(Universelle Profile in der barotropen planetarischen Grenzschicht). Beitr. Physik Atmosphaere, vol 45:148-163, 1972. 19 refs. (Presented at the German Meteorological Society, Essen, West Germany, Sept. 27-Oct. 2, 1971.)*

A closed system of equations for the planetary boundary layer has been developed by a mixing-length hypothesis. Integrations have been carried out for different thermal stratifications giving universal profiles of the variables, which have been made dimensionless by the appropriate internal parameter. Such profiles have been obtained for the deviation from the geostrophic wind, Reynolds stress, eddy viscosity, and dissipation rate of turbulent kinetic energy. Along with other results, evaluations of the universal functions Mn(mu) and N(mu), which appear in the resistance law for a barotropic planetary boundary layer, are reported. (Author abstract modified)

21567 APTIC NO. 40955

Woods, J. D., J. C. Drake, and P. Goldsmith

COALESCENCE IN A TURBULENT CLOUD. *Quart. J. Roy. Meteorol. Soc. (London), 98(415):135-149, Jan. 1972. 26 refs.*

The collision efficiency of small droplets is significantly increased when the interacting drops fall through a laminar shear flow of about 10/sec. The structure of microturbulence in clouds is considered; shears of this magnitude are likely to occur only within a narrow spectral band. This peak in the shear spectrum occurs at a scale that is much larger than the interaction distance of cloud droplets having radii of about 20 micron. Hence it is a good approximation to describe droplet collisions in a turbulent cloud as though they occurred in a steady laminar shear flow. This enhanced droplet coalescence in turbulent clouds may account for the observed development of large cloud droplets in cumulus clouds at rates greater than can be explained by condensation and the efficiency of still-air coalescence. (Author summary modified)

21568 APTIC NO. 40644

Yata, Keizo

SUB-COMMITTEE S REPORT ON AIR POLLUTION BY AUTOMOTIVE EXHAUST. *(Jidosha haishutsu gasu ni yoru taiki osen ni kansuru bunkakai hokoku). Text in Japanese. Nihon Kikai Gakkai-shi (Journal of the Japanese Society of Mechanical Engineers) (Tokyo), 75(637):276-281. 1 ref.*

The density of air pollution caused by automotive emissions in a relatively small area, such as a specific traffic intersection and its vicinity, was measured, taking the number of cars and weather conditions of a given time into account. Air pollution was measured in a large area, such as the entire area of the Tokyo municipality, whose polluted air is attributed largely or partly to automotive emissions. The relationship between automotive exhaust and other sources of pollution was clarified. An Air Pollution Prediction System-I was set up. Photochemical reactions and diffusion were also measured. Carbon monoxide, ozone, and nitrogen dioxide were monitored.

BASIC SCIENCE AND TECHNOLOGY

21569 APTIC NO. 40638

HOT JET SIMULATION FACILITY FOR NLR WIND TUNNELS. *National Aerospace Lab., Amsterdam (Netherlands), 13p., 1971.*

NTIS: N72 15242

The low speed, transonic, and supersonic wind tunnels of National Aerospace Laboratory in Amsterdam have been implemented with a system that can produce hot jets in wind tunnel models. To meet certain conditions in connection with simplicity, easy controllability, and wind tunnel contamination, hydrogen peroxide was chosen as the reactant. For hot jet simulation purposes, H2O2 concentrations of 70 to 90% can be used, yielding stagnation jet temperatures from 250 C to 980 C. Due to this temperature range, adequate hot jet simulation of turbojet engines, with or without afterburning, can be realized, while the properties of rocket engine jets can be closely approximated. The hot jet simulator is a simple device made of stainless steel, consisting of a decomposition chamber containing an injection plate, a silver screen catalyst pack, an end plate, and an exhaust nozzle. The H202 is evenly distributed by the injection plate over the cross section of the catalyst pack, where it is decomposed. The jet stagnation pressure and temperature can be measured with pressure gauges and thermocouples. From their recordings, the correct functioning of the simulator can be checked. The test results obtained using this system are also reported.

21570 APTIC NO. 40755

San Francisco Bay Regional Water Pollution Control Board, Calif.

STAFF REPORT ON A SURVEY OF WATER CONDITIONS IN SAN FRANCISCO BAY SOUTH OF DUMBARTON HIGHWAY BRIDGE ON SEPTEMBER 18 AND 19, 1957. *34p., Feb. 1958.*

The waters of lower San Francisco Bay have for years been seriously degraded by untreated sewage and industrial waste discharged from the sewerage systems of many of the communities south of Dumbarton Highway Bridge. In 1957, various control agencies and the waste dischargers cooperated in an expanded investigation that included measurements of the quality and quantity of the various waste discharges, additional receiving water analyses and observations, and measurements of atmospheric conditions. Samples of the receiving waters were collected throughout the daylight hours on September 18 and 19, 1957. Composite samples of the effluent from each treatment plant in the area were collected for 24-hr periods on September 16, 17, 18, and 19 and were analyzed for five-day biological oxygen demand (BOD), suspended solids, settleable solids, petroleum ether soluble material, and pH. Results showed that dissolved oxygen requirements in current regulations were being violated over large areas of the lower Bay and that dissolved sulfides from San Jose and Sunnyvale wastes were well above prescribed maximum limits for odor control. These two communitties combined were contributing more than 90% of the total waste load in terms of BOD and suspended solids. Proceaures for improving the situation are recommended.

21571 APTIC NO. 40238

Adamson, Arthur W. and B. R. Jones

PHYSICAL ADSORPTION OF VAPORS ON ICE. IV. CARBON DIOXIDE. *J. Colloid Interface Sci., 37(4):831-835, Dec. 1971. 17 refs.*

Carbon dioxide adsorbs rapidly, reversibly, and very weakly on ice powder at 195 K up to a relative pressure of about 0.5. At this point an onset of massive uptake sets in, the relative pressure drops to 0.25, and remains at this value for up to 30 nominal monolayers of adsorbed carbon dioxide. This last pressure, as well as its temperature dependence, is essentially the same as that for the ice-carbon dioxide clathrate equilibrium, and it therefore appears that the massive uptake is due to clathrate formation. The adsorption and desorption processes are slow for the ice-clathrate system, the desorption being found to obey first-order kinetics. Further, after prolonged desorption, a residual, unremovable amount of carbon dioxide is present, corresponding to about a monolayer; this may represent surface carbonic acid formation. (Author abstract modified)

21572 APTIC NO. 40618

Allen, J. B., D. M. Meadows, R. F. Tanner, and L. M. Boggs

VELOCITY OF PARTICULATE IN LAMINAR AND TURBULENT GAS FLOW BY HOLOGRAPHIC TECHNIQUES. *Lockheed-Georgia Co., Marietta, Ga., National Air Pollution Control Administration Contract EHSD 71-34. 126p., Oct. 1971.*

NTIS: PB 206950

A technique for measuring the velocity and behavior of particulates suspended in potential and turbulent air flow by means of double pulsed holography is presented. Descriptions of the air duct facility, particulate dispenser, and holographic systems are provided, as well as discussions of experimental results and theoretical considerations. Double-pulsed holography proved to be an excellent technique for measuring the characteristics of suspended particulate of sizes greater than 6 micron. The measurable characteristics include velocity, three-dimensional coordinates of the particle, size, and shape. Specific experiments were performed to determine the feasibility of the double-pulsed holographic technique. These experiments included studies of particulate behavior in electrostatic fields, in potential and turbulent flow, and around a sampling probe for various sampling conditions. (Author abstract)

21573 APTIC NO. 40134

Anyiwo, J. C. and R. N. Meroney

AN EFFECTIVE-VISCOSITY MODEL FOR TURBULENT WALL BOUNDARY LEVELS. *Colorado State Univ., Fort Collins, Fluid Dynamics and Diffusion Lab., Office of Naval Research Contract N00014-68-A-0493-0001, Proj. NR 062-414/6-6-68(Code 438), CSU Rept. CER70-71JCA-RNM63, 26p., June 1971. 17 refs.*

NTIS: AD 731061

Existing effective viscosity models which have been very valuable in the mean field closure method for turbulent boundary layer computation have shown certain undesirable limitations for certain realistic but general boundary layer flows. The more general flows usually involve non-negligible consideration of pressure gradients and such wall conditions as roughness, curvature and aspiration, or transpiration in varying degrees of importance. The effects of these external and wall influences have, unfortunately, been underplayed by most existing effective viscosity models. The present model of the effective viscosity is developed for a general flow and has shown remarkable agreement with experimentation, without being any more complex than existing models.

21574 APTIC NO. 40288

Ball, R. T. and J. B. Howard

ELECTRIC CHARGE OF CARBON PARTICLES IN FLAMES. *Combustion Inst., Pittsburgh, Pa., Symp. (Int.) Combust. (Proc.), 13th, Salt Lake City, Utah, 1970, p. 353-362. 22 refs. (Aug 23-29.)*

The electric charge of carbon particles sampled downstream of the reaction zone in a premixed propane-oxygen flame was measured using mobility analysis and electron microscopy. The carbon occurred in chain-like agglomerates having 10 to 10,000 sperical particles and 200 to 14,000 positive charges. The average particle diameter within different agglomerates ranged from 170 to 350 A, while the number of charges per particle ranged from 1 to 40 with an average of 2. The charge particle ratio and the average particle size decrease with the number of particles per agglomerate. The average charge/particle ratio and the variation of charge with particle size are close to predicted equilibrium values. However, the charge of many small agglomerates far exceeds the equilibrium value and approaches the theoretical value for breaking particles from the agglomerates by electrostatic tension. The calculated energy barrier to collision between particles having the observed charge far exceeds kinetic energy of the particles. It appears tentatively that agglomeration under the conditions studied occurs with particle growth before the observed degree of charging is attained, and that small, highly charged agglomerates may be fragments broken from peripheral regions of large agglomerates. The results indicate that carbon formation in flames should be susceptible to certain types of control involving manipulation of the electrical properties of the flame. (Author abstract modified)

21575 APTIC NO. 40810

Barbieri, R. and G. Faraglia

RESEARCH ON WACKENRODER S REACTION. NOTE II. ON THE MECHANISM OF THE FORMATION OF INTERNAL SULFUR IN POLYTHIONIC ACIDS. *(Indagini sulla reazione di Wackenroder. Note II. Sul meccanismo di formazione dello zolfo interno deli acidi politionici). Ric. Sci., 2(1):660-675, 1962. 16 refs. Translated from Italian. Translation Consultants, Inc., Arlington, Va., 22p.*

Investigations made with S(35) to determine the mechanism of the formation of internal sulfur in thiosulfuric acids produced by Wackenroder s reaction are presented. The assumption that the first intermediate reaction is asymmetrical thiosulfurous acid, HSSO2H, was investigated. Previous research resulted in a determination of the nature of polythionic acids produced by hydrogen sulfide plus sulfur dioxide and of the origin of the sulfur atoms of the products with respect to those of the reagents. It was possible to accept the succesive formation of thiosulfuric and polythiosulfuric acids as intermediate products of the Wackenroder reaction. This provided the basis for proposing various possible reaction mechanisms with respect to the formation of elemental sulfur and of polythionic acids with internal sulfur with the same formation of elemental sulfur. The reaction that produces polythionic acids with internal sulfur formations of 50% from the sulfur of both reagents was still obscure under different experimental conditions. The investigations were made to clarify the chemical reaction in order to propose a plausible reaction mechanism. Moreover, information was derived to clarify in part the course of the reaction in its first phases. The results of the investigations were very useful in arriving at the proposed probable mechanism. (Author summary modified)

21576 APTIC NO. 40811

Barbieri, Renato

STUDIES ON THE WACKENRODER REACTION. *(Indagini sulla reazione di Wackenroder). Ric. Sci., 2(1):62-67, 1962. 19 refs. Translated from Italian. Translation Consultants, Inc., Arlington, Va., 10p.*

Investigations were made on the reaction thiosulfate plus hydrogen ion in order to determine the nature of the polythionic acids produced and the origin of their sulfur atoms with oxidation numbers 2 and 6. It is possible to verify with paper chromatography that, contrary to nearly all data in literature, the value of x in the thiosulfuric acids (H2SxO6) might vary between 3 and 8 (or even more), and that it depends on the quantity of acid that has been employed in the reaction. Moreover, it is possible to verify, using thiosulfate labelled with (35)S, that contrary to published data, almost all the sulfur with oxidation numbers 2 and 6 of the products H2SxO6 (varying the values of x between 3 and 8) is originated by the sulfur atoms of the starting thiosulfate with the corresponding values of oxidation number. The mechanism proposed by Davis for the course of the reaction is substantially right, and thus the hypothesis that the polythiosulfuric acids appear as intermediate products during the Wackenroder reaction, can be supported. (Author summary)

21577 APTIC NO. 40172

Birely, J. H. and R. J. McNeal

LYMAN-ALPHA EMISSION CROSS SECTIONS FOR COLLISIONS OF 1-25 KEV H+ AND H WITH CO, CO2, CH4, AND NH3. *J. Chem. Phys., 56(5):2189-2194, March 1, 1972. 38 refs.*

Cross sections are reported for emission of Lyman-alpha radiation in collisions of protons and hydrogen atoms with carbon monoxide and carbon dioxide in the 1-25-keV energy range and with ammonia and methane in the range 5-25 keV. In the experiments with CH4 and NH3, the Doppler-shifted Lyman alpha emitted by H(2p) formed in electron capture by fast incident protons or collisional excitation of fast incoming hydrogen atoms, and the virtually unshifted Lyman alpha, emitted by the far slower H(2p) produced in dissociative excitation, were separated. An electric field was applied within the collision chamber, and the increase in Lyman-alpha intensity was used to derive cross sections for formation of H(2s). For CO and CO2 targets, H projectiles are more efficient than H(+) in formation of H(2p), while at energies above 10 keV, H(+) is more efficient than H in formation of H(2s). For both projectiles, the probability of formation of H(2p) is greater than or equal to the probability of forming H(2s). For CH4 and NH3 targets the projectile excitation cross sections are generally similar to those for CO and CO2, and the total projectile excitation cross sections are generally similar to those for CO and CO2, and the total projectile excitation cross section for formation of H(n equals 2) exceeds that for dissociative excitation in either H(+) or H impact. For both projectiles formation of H(2p) in dissociative excitation is at least an order of magnitude more probable than formation of H(2s). Protons are more efficient than hydrogen atoms in production of Lyman alpha via dissociative excitation. Relationships are presented between the projectile excitation cross section and the cross section for electron capture in H(+)impact or stripping in H impact which are relatively independent of the identity of the target molecule. (Author abstract modified)

21578 APTIC NO. 40020

Bittker, David A., and Vincent J. Scullin

GENERAL CHEMICAL KINETICS COMPUTER PROGRAM FOR STATIC AND FLOW REACTIONS, WITH APPLICATION TO COMBUSTION AND SHOCK-TUBE KINETICS. *National Aeronautics and Space Administration, Cleveland, Ohio, Lewis Research Center, NASA-TN-D-6585, Rept. E-5838, Work Unit 129-01, 191p., Jan. 1972. 35 refs.*

A general chemical kinetics computer program for complex, homogeneous ideal gas reactions is described. It is designed for flexibility and convenience in treating reactions under many different conditions. Some of these conditions are reaction behind a shock wave, ignition and combustion reactions in a static or flowing system, combustion and nozzle expansion, and general reaction in a static system or one-dimensional frictionless flow. In any system the temperature or volume or both may be held constant. An implicit numerical integration method is used for the solution of the differential equations that describe a complex reaction. A new step size optimization procedure has been developed to make this technique work efficiently for a wide range of conditions. This includes the extremes of very slow and very fast reaction. The theoretical equations involved, as well as the numerical method of solution, are described. A detailed description of the program is given including preparation of input data, control of accuracy, sample input data, and several examples of test case results. (Author summary)

21579 APTIC NO. 40173

Blyholder, G. and Masako Tanaka

INFRARED SPECTRA OF THE LOW-TEMPERATURE INTERACTION OF CO AND NI. *J. Colloid Interface Sci., 37(4):753-759, Dec. 1971. 24 refs.*

A matrix isolation technique is used to examine with infrared spectroscopy the interaction between nickel particles and carbon monoxide at temperatures down to 44 K. The CO may be brought into contact with the Ni by diffusion within the matrix, by evaporating the argon matrix to leave bare Ni and then adding CO, or by adding CO to the Ar stream during the Ni evaporation. Finely divided Ni interacts with CO in the matrix at 44K to give large infrared bands with maxima near 2080 and 1900/cm, which are proposed as being due to CO on Ni atoms that have low coordination numbers on the surface. The adsorption at 21 K of CO on bare Ni left by evaporating the matrix produces a band at 2060/cm which disappears by 160 K upon warming the sample. Exposure of the bare Ni to CO at 150 K produces bands near 2070 and 1900/cm, apparently indicating an activation energy of a few tenths of a kcal for this adsorption, since this did not occur at 44 K. A major sintering process which greatly reduces the intensity of infrared bands occurs just below room temperature. (Author abstract)

21580 APTIC NO. 40239

Bodman, S. W., P. L. T. Brian, and T. C. Chang

THERMAL CONDUCTIVITY OF A NONEQUILIBRIUM CHEMICALLY REACTING GAS. *Am. Inst. Chem. Engrs. J., 17(6):1304-1310, Nov. 1971. 38 refs.*

Thermal conductivity measurements were made for the disassociating system of nitrogen dioxide with nitric oxide and oxygen. Experiments were made at temperatures from 548K to 792K and pressures from 1 to 30 atm. Under these conditions the chemical reaction is in a nonequilibrium state, and the rate of energy transport is limited by the rates of the forward and reverse reactions. Experimental results agreed well with a theoretical model based on a linearized reaction rate expression. Using the thermal conductivity results, it was also possible to determine the chemical kinetic constants for the reaction. (Author abstract)

21581 APTIC NO. 40659

Bouby, L., F. Fiquet-Fayard, and C. Bodere

THERMAL ELECTRON BOND IN SULFUR DIOXIDE IN GASEOUS PHASE. *(Attachement d electrons thermiques sur l anhydride sulfureux en phase gazeuse). Text in French. Int. J. Mass Spectrom. Ion Phys., 7(5):415-417, Nov. 1971. 10 refs.*

The binding of thermal electrons on sulfur dioxide of 98.5% purity in different carrier gases (nitrogen, ethylene, carbon dioxide, methanol, and ethane) was studied by means of Bradbury s electron filter. The electron source was formed by a thin palladium layer exposed to photoelectric effect. Both the binding coefficient and the bond frequency were determined from the electron and ion currents measured on the collector. Variations in the bond frequency as a function of the pressure were determined. The frequency for SO2+N2 was independent of the pressure within the respective ranges of 0.8-3.2 and 10-160 Torr, and the frequency was a nearly linear function of the pressure in SO2+CO2 and SO2+CH3OH. The bond frequency was proportional to the pressure at low pressure values for SO2+C2H4. Reaction rates for different carrier gases were determined. The bond frequencies had definite limits depending on the nature of the specific carrier gas.

21582 APTIC NO. 40670

Bouchoux, Anne-Marie, Jacques Marchand, and Joseph Janin

VIBRATION TEMPERATURE OF THE SO RADICAL IN HYDROGEN SULFIDE-OXYGEN FLAME. *(Temperature de vibration du radical SO dans la flamme hydrogene sulfure-oxygene). Text in French. C. R. Acad. Sci. Paris, Ser. B, 274(4):256-258, Jan. 1972. 6 refs.*

The vibration temperature of the sulfoxide radical (SO) in the hottest zone of a flame of previously blended hydrogen sulfide and oxygen was determined by means of a spectrograph, in comparing the intensities of two different bands in the H2S-O2 system. The rotation temperature of the SO group was assumed to be identical with that of hydroxide, since Boltzman s equilibrium was existent for the latter in the H2S-O2 flame. The Franck-Gordon factors were computed from spectral data and the rotation constants. The density curves obtained for a spectral range of 8,640-8,720 Angstrom showed a practically constant contrast factor of 0.41 + or 0.02 for the emulsion. The value obtained for the vibration temperature of the SO group (3100 + or 400 K; weighed average), was fairly close to both the theoretical maximum temperature of 3147 K and the rotation temperature of the OH group in the same flame.

21583 APTIC NO. 40127

Brion, C. E., C. A. McDowell, and W. B. Stewart

A COMPARISON OF VIBRATIONAL TRANSITION PROBABILITIES FOR PENNING IONIZATION AND PHOTOIONIZATION OF NO TO THE X1 SIGMA(+) STATE OF NO+. *Chem. Phys. Letters (Amsterdam), 13(1):79-81, Feb. 1, 1972. 10 refs.*

Using helium metastable atoms, the Penning ionization of nitric oxide to the ground state of NO (+) (X1 Epsilon (+) studies with a high resolution electron spectrometer. Vibrational transition probabilities were in excellent agreem5ent with the values obtained from photoionization studies carried out using 584 A helium resonance radiation. The difficulty in accurately measuring the small step heights at high vibrational quantum numbers in the retarding potential curves was overcome by means of the directly obtained differential signal provided by the deflection analyzer used in this study. (Author abstract modified)

21584 APTIC NO. 40514

Brock, J. R.

COMMENTS ON THEORIES OF AEROSOL CHARGING. *J. Colloid Interface Sci., 39(2):418-420, May 1972. 8 refs.*

A summarization and justification of the procedures used in various studies of the charging rate of submicron aerosol particles is presented. The calculation of the charging rate of aerosol particles in the free molecule limit is examined, where the ratio of particle radius (R) to ion mean free path (L) approaches zero. The effect of nonzero values of R/L are also noted. The suitability of the Boltzmann equation for describing the evolution of the velocity distribution function of the ions is established. Then, special solutions of the Boltzmann equation leading to aerosol charging rates are discussed for conditions of both unipolar and bipolar charging.

21585 APTIC NO. 40065

Buettner, Horst and Robert D. Feltham

IRON-SULFUR COMPLEXES OF NITRIC OXIDE AND CARBON MONOXIDE. *Inorg. Chem., 11(5):971-976. 27 refs.*

Sulfur ligands are useful for preparing stable iron complexes of nitric oxide and carbon monoxide. Moreover, polymeric iron-sulfur complexes are an integral part of several enzymes, some of which are important in binding and modifying the reactivity of small molecules. Notable among these non-heme iron proteins are those associated with the enzyme nitrogenase. While some iron-sulfur complexes of NO and CO are known, there has been little systematic investigation of the preparation and properties of these compounds. The present investigations describe the synthesis of some new monomeric and dimeric iron-sulfur complexes of NO and CO. Several new iron nitrosyl and carbonyl complexes stabilized with dithiocarbamate ligands were prepared and characterized. These new complexes include cis-Fe(S2CN9C2H5)2)2(Br)(NO), cis-Fe(S2CN(C2H5))2(I)(NO), cis-Fe(S2CN(C2H5)2)2(CO)2, and the dimeric sulfur-bridged species (Fe(S2CN(C2H5)2)(CO)2SCH3)2. In addition, the compound previously identified as a dinitrosyliron complex was shown to be a compound containing one nitrosyl group and one nitro group, cis-Fe(S2CN(C2H5)2)2(NO2)(NO). The compounds were characterized by means of infrared and nuclear magnetic resonance spectroscopy.

21586 APTIC NO. 40148

Childress, Stephen

VISCOUS FLOW PAST A RANDOM ARRAY OF SPHERES. *J. Chem. Phys., 56(6):2527-2539, March 15, 1972. 11 refs.*

The steady, slow motion of a viscous fluid past a random, uniform array of identical nonoverlapping finite spheres was studied. The expected force acting on any given sphere was obtained by averaging over the ensemble of possible positions of all other spheres. From the Stokes equation an expanded force equation for small particle volume concentration was derived. Terms of this equation include the Stokes force on a single isolated sphere in the same flow and a tensor which is given in terms of the two-sphere distribution function for the array and the Stokes solution for two spheres oriented arbitrarily in an unbounded flow. A physical model for the solution is presented and compared with the model of Brinkman. (Author abstract modified)

21587 APTIC NO. 40155

Chow, T. S. and J. J. Hermans

EFFECT OF INERTIA ON THE BROWNIAN MOTION OF RIGID PARTICLES IN A VISCOUS FLUID. *J. Chem. Phys., 56(6):3150-3154, March 15, 1972. 13 refs.*

From Boussinesq s work it is known that the frictional resistance of a particle in a viscous, inert fluid, depends on its history. This plays an important part in Brownian motion. The general theory of fluctuations in fluid dynamics leads to explicit expressions for the autocorrelation function G(t) for the random force acting on a Brownian particle and the autocorrelation function phi(t) for its velocity. The function G(t) contains an inertial term which depends on the velocity distribution in the liquid surrounding the particle. The results obtained lead to the correct value of the diffusivity. (Author abstract)

21588 APTIC NO. 40236

Cook, G. R. and R. J. McNeal

PHOTOIONIZATION OF VIBRATIONALLY EXCITED NITROGEN. *J. Chem. Phys., 56(3):1388-1399, Feb. 1, 1972. 38 refs.*

A quadrupole mass spectrometer with a photoionization source was used in conjunction with a flowing nitrogen afterglow to obtain the photoionization spectrum of vibrationally excited nitrogen at a spectral resolution of 0.03 nm in the interval 79.58-84.20 nm. This wavelength interval lies below the photoionization threshold of N2 (v double prime equals zero). More than 50 new preionized bands and an underlying continuum have been observed. From estimates of the concentrations of various vibrationally excited states of N2 and measurements of the ionizing photon flux as a function of wavelength, we have estimated the photoionization coefficients of the new preionized bands and continuum. The relative probabilities of various transitions from vibrationally excited N2 to the preionized Rydberg states are different from transitions to the same upper states from N2 owing to different Franck-Condon factors. The vibrationally excited N2 continuum is a sum of continua from all of the vibrational states, each of which rises only slowly from threshold because of the unfavorable transition probability for direct ionization of N2 when delta v does not equal zero. Many of the preionized bands can be attributed in large part to a specific vibrationally excited level, and the application of photoionization as a sensitive tool for studying kinetic processes involving vibrationally excited N2 is proposed. A detection limit of 10 to the 11th molecules/cu cm is obtainable with the present apparatus. Preliminary experiments on the quenching of vibrationally excited N2 by nitrous oxide and carbon dioxide are reported. (Author abstract modified)

21589 APTIC NO. 39891

Coutarel, L., E. Matijevic, M. Kerker, and Chao-Ming Huang

AEROSOL STUDIES BY LIGHT SCATTERING. VI. PREPARATION AND GROWTH OF SULFURIC ACID AEROSOLS. *J. Colloid Interface Sci., 24(3):338-343, July 1967. 11 refs.*

Sulfuric acid aerosols consisting of droplets in the tenth micron size range were prepared by an evaporation-condensation technique, and the particle size distribution determined by light scattering. Particle size increased with boiler temperature and decreased sharply with flow rate. The use of foreign nuclei such as sodium chloride was of no advantage in the preparation. The spread of the distribution as measured by the coefficient of variance ranged from about 0.1 to 0.30. The aerosols could be grown by passing over dilute solutions of sulfuric acid. The sulfuric acid droplets absorbed water until their vapor pressure reached that of the master solution. The extent of growth depended on contact time, varying from about 3% increase in average radius for .1 sec to equilibration for about 100 sec. The coefficient of variance remained approximately constant upon growth, indicating that the rate of growth was proportional to particle volume. (Author abstract modified)

21590 APTIC NO. 40397

Davies, J. T.

TURBULENT JETS OF LIQUIDS IN GASES. *Preprint, Technion-Israel Inst. of Tech., Haifa, 16p., 1971. 7 refs. (Presented at the International Symposim on Two-Phase Systems, Haifa, Israel, Aug. 29-Sept. 2, 1971. Paper 2-8.)*

Turbulent jets of liquids in gases can be formed over a range of Reynolds numbers between those for laminar flow and those for atomization of the liquid. The eddies on the surface of the jet are visible in enlarged flash photographs very soon after the liquid leaves the nozzle. Further along the length of the jet these eddy protuberances show severe damping of the turbulence by surface tension forces. Quantitative studies of this turbulence damping by high speed photography and by mass transfer studies show that the collisions with the surface of the eddies in the jet liquid are between 2% and 10% inelastic. Such inelasticity of collisions (the liquid of the eddy spreads out) leads to viscous loss of energy, and by renewing the surface locally, promotes mass transfer. (Author abstract)

21591 APTIC NO. 40474

Diettrich, Helmut and Hans-Joachim Schmidt

INVESTIGATIONS ON THE EXPANDING ABILITY OF WASTE PRODUCTS FROM MOLTEN ASH CHAMBERS AND OF FLY ASH. *(Untersuchungen ueber das Blaehvermoegen von Schmelzkammeraschen und Flugstaeuben). Text in German. Tonind.-Ztg. Keram. Rundschau (Goslar), 96(4):98-102, April 1972. 4 refs. (Presented at the Meeting on Ascheverwertung, Essen, West Germany, Feb. 8, 1972.)*

The large quantities of waste products from power stations and metallurgical processes may have importance as a light aggregate for use by the building industry. To investigate this possibility, the expansion properties of fly ash and waste products from molten ash chambers, both as supplied and as mixtures with expanded clay, were studied. The slags and fly ash of power plants in three German mining areas were used. The slag was granulated to a size of less than 0.2 mm and mixed with finely pulverized clay and a sufficient amount of water. The mixture was pressed into cylindrical pellets 10 mm high and 10 mm in diameter. After preheating to 500 or 550 C the pellets were thermally treated at temperatures between 1200 and 1300 C. The experiments showed that all types of slag which were used could be treated to provide a suitable light construction material. For the studies of the expansion properties of fly ash six types were used whose suitability for the manufacture of expanding products differed widely. Most of the dusts had higher concentrations of manganese, alkaline substances, and sulfur trioxide than the slag. The fraction of unburned substances differed. A study of the properties of the individual grain size fractions of a dust revealed an influence of the grain size and of the carbon concentration on its expansion capabilities. Through a dust tap-off at certain points in the operation, a fly ash can be obtained which is particularly suitable for the production of expanding agents.

21592 APTIC NO. 40237

Dixon, R. N., G. Duxbury, M. Horani, and J. Rostas

THE H2S+ RADICAL ION. A COMPARISON OF PHOTOELECTRON AND OPTICAL SPECTROSCOPY. *Mol. Phys., 22(6):977-992, 1971. 25 refs.*

The emission spectrum between 4000 and 5000 A obtained by Horani, Leach, and Rostas by controlled energy electron excitation of hydrogen sulfide belongs to H2S positive ion. The decrease and subsequent increase of the bending vibrational intervals in the A(2)A(1) state of H2S(+) and the deuterium sulfide positive radical ion indicates a barrier to linearity of approximately 4600/cm. A preliminary rotational analysis of the spectrum leads to the following molecular parameters for the ground state: molecular constant equals 1.35 A, valence angle 92 deg, 54 min. A detailed comparison of the optical and photoelectron spectra has been made and selection rules for the photoelectron spectra are presented. In order to understand the vibronic patterns of both types of spectra it is necessary to consider in detail Renner-Teller vibronic interaction. A barrier to linearity in the (2)A(1) state of H2S(+) alone is insufficient to account for the interesting change in the spectrum of the (2)A(1)-(1)A(1) transition at energies corresponding to the potential maximum. (Author abstract)

21593 APTIC NO. 40671

Domnin, P. I. and V. L. Kuzmin

ON THE INTERPRETATION OF SPFCTROPHONE MEASUREMENTS OF THE DURATION OF OSCILLATION STATES OF THE CARBON DIOXIDE MOLECULE. *(Ob interpretatsii spektrofonnykh izmereniy vremeni zhizni kolebatel nykh sostoyaniy molekuly CO2). Text in Russian. Opt. i Spektroskopiya, 31(2):209-211, 1971. 7 refs.*

The relaxation time of the asymmetric oscillation energy of the carbon dioxide molecule on the 00 1 level, as measured by means of a spectrophone, was studied, in taking all possible transitions between levels below the above level, into account. The phase shift for high-level excitation was dependent on the respective relaxation times at all lower levels. Kinetic equations describing the variations in the number of molecules in states which participate in the relaxation process are given. The contribution by different states to relaxation was dependent on the probability of the transitions between states. Such transition probabilities were determined for the most probable transitions. The phase shift was determined from a differential equation describing the variations in the kinetic energy. The considerable difference between the theoretically and experimentally determined phase shifts for 76 Hg mm (87 and 11 deg respectively) may be due to the divergence between the theoretical and measured values of the 00 1 upper level destruction rate. The relaxation from the 00 1 level occurred in two channels, on of which was prevalent.

21594 APTIC NO. 40175

Dorfman, A. S. and O. D. Lipovetskaya

AN APPROXIMATE SOLUTION OF THE INTERNAL PROBLEM OF A TURBULENT BOUNDARY LAYER. *(Priblizhennoe reshenie vnutrennei zadachi dlya turbulentnogo pogranichnogo sloya). Inzh. Fiz. Zh., 18(2):224-232, Feb. 1970. 6 refs. Translated from Russian. Leo Kanner Assoc., Redwood City, Calif., 9p., July 6, 1971.*

NTIS: AD 730477

The development of a turbulent boundary layer in an axisymmetric channel with a calculation of the interaction of the boundary layer and the center of the flow is considered. The relationships are obtained for separation points, joining points of the layers, and other characteristics from the Reynolds number and the geometric characteristics of the channel. A simple approximate method of calculation of the boundary flow in a channel with curvilinear generatrix is proposed.

21595 APTIC NO. 40348

Fair, Donald H., John B. Clements, and George B. Morgan

STORAGE AND RETRIEVAL OF AEROMETRIC DATA. PARAMETER CODING MANUAL. *Environmental Protection Agency, Research Triangle Park, N. C., Office of Air Programs, Pub-APTD-0633, 200p., July 1971.*

NTIS: PB 207348

This manual presents the five-digit coding system used by the Environmental Protection Agency in maintaining the computerized National Aerometric Data Bank. Codes for six of nine major classes are presented: Suspended Particulates; Settled Particulates; Respirable Particulates; Gases and Vapors; Biocides, Allergens and Pathogens; Atmospheric and Related Parameters. Three classes remain undeveloped: Basic Effects; Fractional Particulates; and Miscellaneous. Each major class is divided into nine subclasses, each subclass into nine families; each family may contain up to 99 pollutants and parameters. This system permits the assignment of a five-digit code number to over 72,000 aerometric pollutants and parameters. An example of assignment of a code is presented to enhance the user s understanding of the SAROAD system and to show how to use the manual to find codes already assigned.

21596 APTIC NO. 40315

Fenimore, C. P.

FORMATION OF NITRIC OXIDE IN PREMIXED HYDROCARBON FLAMES. *Combustion Inst., Pittsburgh, Pa., Symp. (Int.) Combust., (Proc.), 13th, Salt Lake City, Utah, 1970, p. 373-380, 7 refs. (Aug. 23-29.)*

The formation of nitric oxide was followed by probing flames of ethylene, methane, or propane with N2-O2 mixtures. The known kinetic laws of the well understood N2-O2-NO system (limited by the rate of the reaction O +N2 yeilds N +NO) described the growth on NO in the post-flame gas, after hydrocarbons were consumed, but could not describe a faster, transient formation of NO in the primary reaction zone. The transient formation did not occur in hydrogen or carbon monoxide flames, and therefore may involve an attack of carbon or hydrocarbon radicals on nitrogen molecules. At atmospheric pressure, the transient formation gave its greatest yield in flames containing 1.3 to 1.4 times the stoichiometric amount of fuel. Its yeild increased somewhat with pressure, particularly in fuel-lean flames, so that at 3 atmos pressure the NO that formed quickly in the primary reaction zone was about the same in flames of 0.8 as of 1.4 mixture strength. The transient formation possessed a relatively weak temperature dependence. Extrapolating the measurements, the new mechanism may contribute significantly to the emission of nitrogen oxides from a gas turbine, but the major contribution occurs by the known mechanism of the N2-O2 system. (Author abstract modified)

21597 APTIC NO. 40353

Fuchshuber, Peter

WOOD WASTES ALSO HEAT HEAT-CARRIER MEDIA. *(Auch Holzabfaelle heizen Waermetraegermedien). Text in German. Energie (Munich), 24(2):11-13, April 1972.*

In a wood preocessing plant the quantity of wood waste amounts to 450 kg/hr which yields a daily quantity of several tons. Since this wood refuse has a heating value of about 1.2 million kcal/hr, it is being used as a fuel instead of being disposed of as the wastes are burned in a combustion chamber, the hot flue gases which develop serve to heat oil in two boilers which function as heat carrier, providing various presses, driers, and melting boilers with heat. An additional gas burner has been installed in order to guarantee continuous operation in case of a shortage of wood wastes.

21598 APTIC NO. 40696

Generalov, M. A., G. I. Kozlov, and I. K. Selezneva

ON THE POPULATION INVERSION OF CO2 MOLECULES IN EXPANDING GAS FLOWS. *Prikl. Mekh. Tekh. Fiz., no. 5:24-34, 1971. 17 refs. Translated from Russian. John Crerar Library, Chicago, Ill., National Translation Center, 13p., 1971.*

The system of hydrodynamic equations was solved numerically in combination with the kinetic equations of excitation of the vibrational degrees of freedom of molecules, which describes the process of escape of a carbon dioxide-nitrogen-helium, water mixture from a nozzle. Under definite conditions a population inversion of the CO2 molecules relative to the transition 00.1 10.0 will originate at the nozzle exit, and its magnitude will depend on both the nozzle configuration and the initial values of the gas temperature and pressure. For a given nozzle configuration there exist optimal values of these parameters for which the population inversion of CO2 molecules will reach approximately 10 to the 15th power cu cm.

21599 APTIC NO. 40150

Gianturco, I. A. and J. H. Tait

EFFECT OF THE MOLECULAR WAVEFUNCTION ON ELECTRON-MOLECULE SCATTERING AT NEAR-THERMAL ENERGIES: A PRELIMINARY STUDY FOR CO. *Chem. Phys. Letters (Amsterdam), 12(4):589-595, Jan. 15, 1972. 16 refs.*

Complete quantum-mechanical computations regarding electron-diatom collision processes at near-thermal energies are performed and discussed for the carbon monoxide case within the fixed-molecule representation. The accuracy obtained for the MO LCAO wavefunction describing the molecular target is an important factor in assessing the quality of the scattering model against experimental results. This was done by assessing the sensitivity of the static potential coefficients to an increased flexibility of the basis set chosen for the molecular wavefunction. The extended basis set (EXTD) and the more rigid double-zeta basis set (DZ) were considered.

21600 APTIC NO. 40707

Gil denblat, I. A., A. I. Rodionov, and B. I. Demchenko

ON THE EFFECT OF THE MOLECULAR DIFFUSION ON THE MASS TRANSFER INTENSITY IN THE REACTIONS OF GASES AND LIQUIDS WITH DIFFERENT SURFACE TENSIONS AND VISCOSITIES. *(O vliyanii molekulyarnoy diffuzii n intensivnost massoobmena vo vzaimodeystvuyushchikh s gazami zhidkostyakh s razlichnymi poverkhnostnymi natyazseniyami i vyazkostyami). Text in Russian. Dok. Akad. Nauk SSSR, 198(5):1149-1151, 1971. 13 refs.*

The effects of the physical properties of distilled water, isobutyl and isopropyl alcohols, glycol, and heptane on the character of the dependence of the mass transfer coefficient in the liquid phase on the molecular diffusion coefficient in turbulent and laminar flow were studied. The ratio of the diffusion coefficients of the gases investigated (carbon dioxide, xenon, and helium) in water and organic solvents were assumed to be the same. The experiments revealed that the character of the dependence of the mass transfer coefficient of the molecular diffusion coefficient in reactions of gases with turbulent and laminar liquid flows with different surface tensions and viscosities was practically the same. The factor characterizing the dependence was close to 0.5, which corresponded to a value of two according to the law of the damping of turbulent pulsations when nearing the liquid-gas interface.

21601 APTIC NO. 39901

Hoare, D. E., A. D. Walsh, and Ting-Man Li

THE OXIDATION OF TETRAMETHYL LEAD AND RELATED REACTIONS. *Combustion Inst., Pittsburgh, Pa., Symp. (Int.) Combust. (Proc.), 13th, Salt Lake City, Utah, 1970, p. 461-469. 19 refs. (Aug. 23-29.)*

The reaction of pure tetramethyl lead (TML) with oxygen and reactions of lead monoxide with formaldehyde, methanol, carbon monoxide, and di-tert-butyl peroxide were studied at 330 C in a static system. The major products in the early stages of TML oxidation were carbon dioxide and hydrogen; methanol was a less important product, and methane a minor product. The overall reaction was nonchain; therefore it did not involve CH2Pb(CH3)3 radicals. It seems likely that the main reaction occurred via methyl radicals which were oxidized to methyl peroxy radicals at a rate consistent with that published by Barnard and Cohen. It appeared that hydrogen was adsorbed on the surface of lead monoxide, and it is postulated that reduction of peroxy and oxy radicals may have occurred. Nonchain propagation reactions for the formation of methanol and formaldehyde are therefore postulated. Formaldehyde was oxidized very rapidly on a lead monoxide surface to give the same products of carbon dioxide, and initially, smaller amounts of hydrogen, so it well may be an intermediate in the oxidation of TML. Carbon monoxide and methanol oxidized too slowly to be intermediates, and di-tert-butyl peroxide was unaffected in its decomposition by a surface of lead monoxide. Presumably methyl radicals do not react with the surface. The results show that lead monoxide, which is said to be an effective inhibitor of combustion by removal of peroxides, also may be effective by removal of formaldehyde, where formaldehyde is a degenerate branching intermediate, e.g., in high-temperature combustion. (Author abstract modified)

21602 APTIC NO. 40154

Izod, T. P. J., G. B. Kistiakowsky, and S. Matsuda

MECHANISM OF OXIDATION OF CARBON MONOXIDE IN PRESENCE OF CHROMIUM CARBONYL. *J. Chem. Phys., 56(3):1083-1090, Feb. 1, 1972. 22 refs.*

The catalytic effect of small concentrations of chromium vapor, added in the form of chromium hexacarbonyl on the oxidation of carbon monoxide was investigated at temperatures between 1100 and 2200 K in shock waves using two different methods of product detection. The formation of carbon dioxide in incident shock waves of CO/oxygen/argon mixtures containing between 100 and 500 ppm Cr(CO)6, at a total gas density of about 5.0 times 10 to the 17th power particles/cc, was followed by infrared emission over a time scale of 1500 microseconds particle time. The rate of CO2 formation was much larger than in the absence of Cr(CO)6 and the CO2 concentration rose linearly with time. A complete intermediate and product analysis was performed by shock heating various CO/O2/Neon mixtures containing 0.4% Cr(CO)6 and observing the reaction species in reflected shock waves by means of a time-of-flight mass spectrometer during 180 microseconds. The thermal decomposition of Cr(CO)6 is very rapid at all experimental temperatures. The oxides of chromium, CrO, CrO2, and CrO3, were observed together with Cr. A chain mechanism involving these oxides is proposed to account for the catalysis of CO oxidation by Cr(CO)6, and rate constants for the chain reactions are estimated. A rather sudden cessation of the catalytic effect was observed under varying conditions of (Cr) and temperature. Mass spectrometric analysis indicated the disappearance of atomic Cr and its oxides from the gas phase under these conditions. A very rapid condensation of Cr atoms when chromium vapor becomes highly supersaturated is proposed to account for this phenomenon. (Author abstract)

21603 APTIC NO. 40415

Keng, Edward Y. H., Richard R. C. Chu, James A. Knight, Jr., and Clyde Orr, Jr.

AEROSOLS PRODUCED BY X-RAYS. *J. Colloid Interface Sci., 39(1):94-102, April 1972. 6 refs.*

Small proportions of organic vapors in air produce aerosols under the influence of X-rays. The particulates are generally spherical in shape and less than a micron in diameter. Those formed from acetylene and benzene vapor appear to be yellow and brown, respectively. They are essentially nonvolatile at room temperature and are very stable even when exposed to the high vacuum of an electron microscope. However, a substantial size reduction was attained by several hours of heating at 250 C under atmospheric pressure. The size and quantity of the particulates formed under X-irradiation depend on the organic vapor, its concentration, the intensity of the X-rays, irradiation time, and aging time after exposure. The mass concentration also increases as the relative humidity of the air increases to about 5% and then decreases as the relative humidity is further increased. However, the particulate size is greater in air of higher humidities despite the lower mass concentration. Infrared spectrum analysis of particulates formed from X-irradiated air containing benzene and acetylene indicates the presence of acetylenic and aromatic structures with carbonyl groups. (Author abstract modified)

21604 APTIC NO. 40501

Koebke, R. H.

STREAMING OF A PARTICULATE AEROSOL DUE TO ACOUSTIC EXCITATION. *Water, Air, Soil Pollut., 1(2):212-226, April 1972. 11 refs.*

The acoustic equations pertaining to an aerosol containing small solid particles in suspension are developed. In order to study the acoustic streaming of this medium, that is, the steady unidirectional motion of particles which is superimposed upon the oscillatory acoustic motion, it is necessary to carry the analysis to so-called second order acoustic variables. The inclusion of the dynamic and thermal properties of the suspended particles significantly influences the attenuation of sound and the streaming of the medium. Since the well known but presently unexploited process of sonic agglomeration of particle aerosols depends to a large extent upon the acoustic streaming phenomenon, it is suggested that this work may be useful in further development of this process. A numerical example describing the streaming of an aerosol in a duct under the influence of acoustic excitation is developed in some detail. (Author abstract)

21605 APTIC NO. 40091

Kubowitz, Fritz and Erwin Haas

DEVELOPING PHOTOCHEMICAL METHODS FOR THE STUDY OF THE OXYGEN CARRYING ENZYME. (APPLICATION TO ACETIC ACID BACTERIA AND YEAST CELLS). *(Ausbau der photochemischen Methoden zur Untersuchung des sauerstoffuebertragenden Ferments. (Anwendung auf Essigbakterien und Hefezellen). Text in German. Biochem. Z., vol. 255:247-277, 1932. 13 refs.*

Long-wave secondary bands of enzymes were determined and 37 lines of sufficient intensity were isolated in a range of 193-671 micron. The metabolism of acetic acid bacteria and yeast cells was reduced to 30% of the normal value, and then increased to 60% by means of irradiation. The relative absorption spectrum was determined from the light intensity caused by an increase in the metabolism. Acetic acid bacteria were more sensitive to carbon monoxide than the yeast cells in darkness, while the latter were more sensitive to light. Increased light sensitivity was observed with decreasing temperature. The CO-compound of the yeast cells had a sensitivity 4-5 times higher at O C than at 10 C. The alpha and beta bands of the CO-compounds of the acetic acid bacteria and yeast cells were found at 590 and 540 micron respectively, and an additiona5l beta prime band was determined for acetic acid bacteria at 524 micron. The ferment spectra showed a red shift relative to hemoglobin spectra; the respective main bands were 430 and 420 micron. Carboxyhemoglobin had an alpha band at 570 micron; the beta prime band was non-existent. The latter was found at 520 micron in CO-chlorocuorin. The ferments sh7owed greater resemblanc to chlorocuorin than to hemoglobin. The ratios of the absorption coefficients for the characteristic wave lengths revealed the ferment hemin to be of spirographis type. Respiratory enzyme and cytochrome are chemically different and have different absorption spectra.

21606 APTIC NO. 40679

Levi, Georges, Maurice Chalaye, and Elie Dayan

EXPERIMENTAL AND COMPUTED ROTATIONAL CORRELATION FUNCTIONS OF THE GASEOUS MIXTURES OF CO OR N2O WITH DIVERSE GASES. *(Fonctions de correlation rotationnelles experimentales et calculees des melanges gazeux de CO ou N2O avec divers gaz). Text in French. C. R. Acad. Sci. Paris, Ser. B, 274(1):50-53, Jan. 1972. 7 refs.*

Experimental rotational correlation functions of the vibrations of carbon monoxide and nitrous oxide in mixtures with helium, argon, hydrogen, oxygen, nitrogen, and carbon dioxide were determined. The correlation functions for the vibrations of N2O at 1285/cm and 2350/cm were identical. The rotation was disturbed by helium and hydrogen less than by oxygen, argon, and nitrogen. The frequency of the molecular impacts linearly increased with the pressure. The correlation functions were computed by means of Gordon s m diffusion model. A comparison of the experimental and the theoretical results confirmed the good applicability of the above model to the description of the reorientation of CO and N2O. The motions due to the molecular reorientation of compressed CO and N2O molecules were determined to be angular rotations in an order of magnitude of 180 deg. with angular velocities following impact approximately the same.

21607 APTIC NO. 40015

Lissi, Eduardo, R. Simonaitis, and Julian Heicklen

THE BROMINE ATOM CATALYZED OXIDATION OF CARBON MONOXIDE. *J. Phys. Chem., 76(10):1416-1419, May 11, 1972. 16 refs.*

Photolization of bromine gas at 3660 angstroms and room temperature in the presence of oxygen and carbon monoxide yields carbon dioxide The rate constant is 4.8 times 10 to the minus 7th power/torr./min to the one-half power. The ratio of the rate constants of the reactions determines whether CO2 is produced. The full mechanism is outlined and the reaction steps are discussed.

21608 APTIC NO. 40214

Lucas, W. R.

DIRECT OXYGEN REGENERATION OF SPENT PETROLEUM CAUSTICS. *Ind. Eng. Chem., 51(2):84A-85A, Feb. 1959.*

Caustic treating has remained as a general operation in petroleum refining despite the increased use of hydrogenation and reforming. Various techniques of regenerating spent caustics such as air oxidation, stripping with flue gas or steam, and electrolysis have been developed and are being used. However, each of these methods has its disadvantages, air oxidation for example, may result in serious air pollution. A process for the direct oxygen regeneration of spent refinery caustics that has been developed as a comprehensive solution to these difficulties and in anticipation of future legislation on stream and air pollution is described. The process has been adapted to the regeneration of various caustic mixtures and the removal of sulfides and mercaptans from waste waters and crude cresylic acids. Operation of the process on spent caustics from the treating of gasoline and light hydrocarbons is based on the conversion accomplished with oxygen in a gas dispersion reactor of special design under conditions of essentially ambient temperature and pressure. The reaction is indicated, as well as the effect of mercaptans, process flow, and economics.

21609 APTIC NO. 40135

McClelland, Bruce W., Grete Gundersen, and Kenneth Hedberg

REINVESTIGATION OF THE STRUCTURE OF DINITROGEN TETROXIDE, N2O4, BY GASEOUS ELECTRON DIFFRACTION. *J. Chem. Phys., 56(9):4541-4545, May 1, 1972. 31 refs.*

The structure of dinitrogen tetroxide, N2O4, is discussed. Pure N2O4 as a solid at not-too-low temperatures, liquid, and gas consists of coplanar molecules of D(2h) symmetry having the configuration O2N-NO2. The existence of molecules with the same configuration but staggered (symmetry D(2d)) and molecules with the configuration O2N-ONO has also been reported both in solid N2O4 at liquid nitrogen temperatures and in matrix-isolated N2O4 at liquid helium temperatures. Values for the structural parameters of the D(2h) symmetry specials have been obtained from x-ray crystallographic and gas electron-diffraction. This electron diffraction reinvestigation of the structure of N2O4 was prompted partly by the fear that the earlier work may have been slightly in error in the size, or scale, of the molecule and partly by a wish to study its conformation more carefully. The results agree with the earlier study so far as the molecular shape is concerned, but the size of the molecule appears to be about 0.9% larger than originally thought.

21610 APTIC NO. 40100

Niatel, Marie-Therese

EXPERIMENTAL STUDY OF THE EFFECT OF WATER VAPOR ON THE IONIZATION PRODUCED IN AIR. *(Etude experimentale de l influence de la vapeur d eau sur l ionisation produite dans l air). Text in French. C. R. Acad. Sci. Paris, Ser. B, 268(25):1650-1653, June 1969. 11 refs.*

The effect of low quantities of water vapor on the ionization produced in air was studied in an X-ray ionization chamber by comparing the ionization currents for the test chamber to a standard. The curve obtained for the relative variations of the ionization current as a function of the relative partial pressure of the water vapor was in good accordance with theoretical expectations for medium to high humidities, while the divergences for low humidities were considerable. This may be due to the approximate character of the hypothesis on the independent contributions of air and water vapor to total ionization. The rapid increase in ionization due to the vapor content rising from zero to a few thousandths may be the result of the abnormally rapid decrease in the energy required to produce one pair of ions in air. Further investigations are required to ascertain the role of low quantities of impurities in dry air in the variations of the ionization energy.

21611 APTIC NO. 40171

Oettinger, P. E. and K. P. Horn

INFRARED EMISSION AT 2.7 MICRON FROM FLOWING CO2-N2 MIXTURES. *J. Chem. Phys., 56(5):1834-1838, March 1, 1972. 19 refs.*

A flow tube was constructed wherein ground-state carbon dioxide and vibrationally excited nitrogen molecular streams interact and the combined flow is spectrally investigated at selected downstream stations. The close coupling between the lower vibrational levels of N2 (X (1)sigma g (+)) and the CO2 asymmetric stretch mode allows rapid energy exchange to these levels, followed by internal redistribution among the vibrational states of the various CO2 modes. When emission at the 2.7 micron bands is monitored, it has been observed that such redistribution produces substantial population of the mixed-mode levels associated with this radiation. Comparison of the observed band profiles with analytically derived counterparts has indicated that for an N2 vibrational temperature of 1900 K, CO2 difference bands at 2.7 micron contribute approximately 2.5 times as much radiant energy as is emitted in the 10 deg 1-00 deg 0 and 02 deg 1-00 deg 0 summation bands.

21612 APTIC NO. 40490

Onishi, Yoshito

THE CATALYTIC DECOMPOSITION OF NITROUS OXIDE ON TITANIUM DIOXIDE; ANATASE AND RUTILE. *Bull. Chem. Soc. Japan (Tokyo), 45(3):922-923, March 1972. 16 refs.*

Studies on the catalytic oxidation of carbon monoxide on anatase and rutile (forms of titanium dioxide) confirmed that the catalytic action of titanium dioxide differed with its crystal form. In order to examine whether the same result is obtained in other reactions, the catalytic decomposition of nitrous oxide on titanium dioxide was carried out. Each of the three crystal forms, anatase, rutile, and an anatase-rutile mixture determined a different constant rate of reaction in the nitrous oxide decomposition; the rutile and the anatase-rutile mixture were obtained by heating the anatase at 1150 C for 3 hr and at 1050 C for 1 hr, respectively. The decomposition rate with the rutile was much larger than that of the anatase at the same temperature, as in the case of oxidation of carbon monoxide. The rate constants of the sample anatase-rutile mixture were calculated by assuming that the catalytic activity of an anatase-type surface and that of a rutile-type surface was equal to those of pure anatase and rutile, respectively. Since that the surface area ratio of the sample mixture was approximately 86.8/13.2 anatase/rutile, the rate constants could be calculated by using the values of the anatase and rutile constants. The calculated results were in good agreement with the measured values.

21613 APTIC NO. 40458

Pirie, M. A. M.

THE THERMODYNAMIC AND TRANSPORT PROPERTIES OF AIR AND CO2. *Central Electricity Generating Board (England), Research Dept., 35p., March 1971. 5 refs.*

NTIS: RD/B/M-1955

The thermodynamic and transport properties necessary for heat transfer and gas flow experiments using air and carbon dioxide are given in graphical form. The temperature and pressure ranges covered are from 0 to 500 C for air and 0 to 700 C for CO2 and 0.5 bar to 4 bar for air and 0 to 60 bar for CO2, respectively. Parameters recorded are density, enthalpy, Prandtl number, ratio of specific heats, specific heat, thermal conductivity, and viscosity. These are presented in S.I. units with conversion factors to allow other systems of units to be obtained.

21614 APTIC NO. 40714

Pokrovsky, O. M.

A COMPARISON OF STATISTICAL METHODS FOR THE RESOLUTION OF INVERSE PROBLEMS IN ATMOSPHERIC OPTICS. *(Sravneniye statisticheskikh metodov resheniya obratnykh zadach atmosfernoy optiki). Text in Russian. Izv. Akad. Nauk SSSR, Fiz. Atmosfery i Okeana, 8(2):231-233, 1972. 6 refs.*

The theoretical possibilities involved in two different statistical methods for the resolution of inverse problems are compared. The first method involves expansion in a system of orthogonal functions, describeable in matrix form, while the second is that of statistical regularization. Formula for the criteria of the optimum approximation of the correct resolution by the first method, and another formula for the mean deviation of the approximative regularized resolution from the correct resolution by the second method are given. The theoretical accuracy of the resolution by the second method was determined to be higher than by the first one. The results of the analysis indicate that the method of the statistical regularization should be applied to the resolution of inverse problems when empiric statistics of the searched function are available.

21615 APTIC NO. 40387

Pollitzer, E. L.

PLATINUM CATALYSTS IN LEAD-FREE GASOLINE PRODUCTION. *Platinum Metals Rev., 16(2):42-47, April 1972.*

Processes applicable the manufacture of lead-free clear gasoline and the role of platinum catalysts in such a conversion are discussed. Since the octane number of the U. S. gasoline pool is about 89.5 Research Octane Number on a lead-free basis, it is obvious that a boost in octane will be required if there is a general conversion to lead-free gasoline. Catalytic reforming has been used to produce high octane blending components and, in a new approach to the problems of catalyst stability at high severities, a continuous Platformer has been designed and built. Catalyst is continuously withdrawn from the lowest reactor in the stacked configuration, continuously regenerated in an external system, and continuously returned to the lead reactor. However, the most publicized advance in the area of catalytic reforming concerns the development of a family of new reforming catalysts which contain a modifier in addition to platinum. The main characteristic of such catalysts is greatly improved temperature stability and, particularly, yield stability. The new reforming catalysts and catalytic reforming are discussed, as well as the proposal to upgrade some of the lower octane gasoline components instead of trying to overwhelm them by the addition of high octane Platformate. This approach will probably involve a number of different processes but it is more than likely that the first step will involve isomerization of pentanes and hexanes. Increased production of alkylate is considered.

21616 APTIC NO. 40676

Privalov, A. M., 5L. G. Karpov, and F. I. Vilisov

PHOTOCHEMICAL PROCESSES IN THE PHOTOLYSIS OF 02 AND 02 PLUS M MIXTURES, WHERE M EQUALS HE, AR, XE, N2, CO2. *Khim. Vysokik. Energiy), 5(5):388-392, 1971. 28 refs. Translated from Russian. John Crerar Library, Chicago, Ill., National Translations Center, 7p., 1971.*

On the basis of published results, an analysis is made of reactions possible in the photolysis of oxygen plus M mixtures in the domain of the Schumann-Runge continuum. A mechanism is proposed which permits calculation of the magnitude of the absolute quantum yield of ozone formation for its low concentrations, and the value of the ozone concentration for photochemical equilibrium of the mixture 02 + 03 + M. The mechanism proposed for low ozone concentrations is verified for pure oxygen, and Oxygen plus M mixtures, where M equals helium, argon, xenon, nitrogen, and carbon dioxide. Good agreement is obtained with experimental results.

21617 APTIC NO. 40666

Rathke, Michael W. and Helen Yu

THE REACTION OF ORGANOZINC COMPOUNDS WITH CARBON MONOXIDE. *J. Org. Chem., 37(11):1732-1734, June 12, 1972. 11 refs.*

Di-n-butylzinc and diisopropylzinc react with carbon monoxide at atmospheric pressure in the presence of potassium tert-butoxide to furnish, after hydrolysis, the corresponding acyloins. In the absence of the base, the two organozinc compounds are inert to CO. Diphenylzinc absorbs only small amounts of CO in the presence of potassium tert-butoxide and the only indetified product is biphenyl. The n-Butylzinc iodide is inert to CO at atmospheric pressure, with or without added potassium tert-butoxide. A possible mechanism for the base-promoted carbonylation of dialkylzinc compounds is presented. (Author abstract modified)

21618 APTIC NO. 40746

Riley, J. and S. Corrsin

SIMULATION AND COMPUTATION OF DISPERSION IN TURBULENT SHEAR FLOW. *Preprint, American Meteorology Society, Boston, Mass. and Air Pollution Control Assoc., Pittsburgh, Pa., p. 16-21, 1971. 8 refs. (Presented at the Conference on Air Pollution Meteorology, Raleigh, N. C., April 5-9, 1971.)*

The dispersion of fluid material points and of small, alien particles on both homogeneous, turbulent shear flows, and isotropic turbulence is studied by numerical simulation of the flow field. The method is to set up a mathematical model of the random isochoric Eulerian field, and to compute the dispersion on this field. In the simulation of fluid particle dispersion on the shear flow, the results were in agreement with both the short and long term predictions for turbulent heat transfer. Some directional properties for dispersion were resolved. With these results it is possible to examine closely the effect of gravity on the dispersion of the particles, as well as the direct inertial effect, and the crossing trajectories effect of the particles on the model fields.

21619 APTIC NO. 40119

Saffar, Z. M. El and P. Schultz

ON A PROTON MAGNETIC RESONANCE STUDY OF H2S AND H2SE. *J. Chem. Phys., 56(6):2524-2526, March 15, 1972. 26 refs.*

The proton magnetic resonance line shape and second moment have been studied in hydrogen sulfide and hydrogen selenide at 58 K. The observed second moment values indicate that the lattice of H2S and H2Se is essentially rigid at this temperature. The line shapes have been fitted by the method of least squares to a theoretical line-shape function having the intramolecular H-H distance as an adjustable parameter. The H-H distances obtained are 1.883 plus or minus 0.007 A for H2S and 2.014 plus or minus 0.011 A for H2Se. (Author abstract)

21620 APTIC NO. 40188

Samchenko, N. P., M. T. Rusov, and E. S. Malyk

EFFECT OF SUPERSTOICHIOMETRIC ZINC ON SELECTIVITY OF ZINC OXIDE CONTACTS IN REACTION OF CARBONIC OXIDE HYDROGENATION. *(Vplyv nadstekhiometrychnoho tsynku na selektyvnist okysnotsynkovykh kontaktiv v reaktsiyi hidruvannya okysu vuhletsyu). Text in Ukranian. Dopov. Akad. Nauk Ukr. RSR, Ser. B., 33(12):1105-1108, 1971. 10 refs.*

The effect of superstoichiometric zinc on selectivity of zinc oxide in reaction of carbon monoxide hydrogenation was studied. A direct connection between the degree of contact reduction and the content of methanol higher alcohols and water in condenser exists. With an increase in superstoichiometric zinc in the catalyst, its selectivity for methanol drops and accordingly rises with respect to higher alcohols. Introduction of potassium carbonate into zinc oxide and zinc-chromium catalyst increases their reductivity, simultaneously changing the superstoichiometric zinc concentration; the contact selectivity changes in the process of carbon monoxide hydrogenation. (Author summary)

21621 APTIC NO. 39811

Sand, Michael L., William S. Coblenz, and L. B. Sand

SYNTHESIS OF LITHIUM AND LITHIUM, SODIUM MORDENITES. *Advan. Chem. Ser., no. 101:127-134, 1971. 13 refs. (Presented at the Americal Chemical Society, Div. of Physical Chemistry, International Conference, 2nd, Worcester, Mass, Sept. 8-11, 1970.)*

First syntheses are reported for lithium mordenite, lithium analcime, and lithium phillipsite. Lithium mordenite was synthesized at 150-200 C under autogenous pressure. Coexisting phases found with the mordenite were lithium analcime, lithium phillipsite, quartz, opaline silica, and lithium silicate. The best yields of Li-mordenite were obtained using aqueous collodial silica sol, aluminum hydroxide, and lithium carbonate as reactants. Li,Na-mordenite was synthesized in the system (0.5Li20-0.5Na20)-Al203-Si02-H2O at 150-190 C, with analcime, phillipsites, quartz, opaline silica, and alkali silicates found as coexisting phases. The Li,Na-mordenites contain the same Li/Na ratio as in the batch composition. Best yields were obtained using silicic acid, aluminum hydroxide, lithium hydroxide, and sodium hydroxide as reactants. Comparative data are given for the reactant conditions producing the Li, Li,Na-, and Na-mordenites. (Author abstract)

21622 APTIC NO. 40498

Shahriari, Siamak and F. C. Goodrich

THE KINETICS OF GROWTH OF AN AEROSOL IN A FLOW REACTOR. II THEORETICAL. *J. Colloid Interface Sci., 39(1):312-3[illegible], April 1972. 12 refs.*

An attempt to theoretically interpret the results from a previous investigation into the growth kinetics of a dibutyl phthalate (D.B.P.) aerosol grown from a carrier gas supersaturated with D.B.P. vapor is presented. Over the early stages of growth process (time t less than .03 sec) the rate of growth of D.B.P. aerosol droplets can be interpreted successfully in terms of a collision hypothesis based upon the assumption that a droplet grows at the maximum rate permitted by the kinetic theory of gases. This model ignores any local diffusion field of D.B.P. vapor in the neighborhood of the drop and neglects the reverse or evaporation reaction of the drop. Furthermore, the model ignores statistical variations in the rate of capture of D.B.P. molecules and treats every drop as a perfect duplicate of every other drop in the assembly. Over the later stages of growth, this collision model simply fails to agree with the growth rate observed. To account for this failure, the creation of a diffusion field of dibutyl phthalate vapor in the neighborhood of each growing droplet is assumed, with growth controlled but by the collision rate predicted from the kinetic theory of gases, but rather by the rate of diffusion of D.B.P. vapor molecules through the carrier gas. Under either hypothesis, the accomodation coefficient of vapor molecules striking the liquid surface is unity.

21623 APTIC NO. 40499

Shahriari, Siamak, A. N. Sarmiento, and F. C. Goodrich

THE KINETICS OF GROWTH OF AN AEROSOL IN A FLOW REACTOR. I. EXPERIMENTAL. *J. Colloid Interface Sci., 39(1):305-311, April 1972. 9 refs.*

Using a modified apparatus design for generation of nearly monodisperse aerosols in a size range convenient for study by light scattering, the kinetics of dibutyl phthalate aerosol droplets nucleated by sodium chloride particles in a supersaturated jet were examined. The apparatus design was such that filtered carrier gas from a tank passed through a flowmeter into a furnace containing a bed of sodium chloride. The sublimations from the sodium chloride were than swept into an aerosol generator from which the carrier gas emerged saturated or nearly saturated with aerosol vapor. Nucleation and growth occurred in a following section at the end of which a band of heating tape created a hot zone which destroyed the aerosol. Reformed aerosol appeared in the atmosphere as a jet intersecting the light beam from a light scattering photometer. Finally an exhaust manifold was maintained at gentle suction immediately above the jet so that spent aerosol was removed into a hood. Significantly, the orifice of the jet was narrower than the diameter of the light beam used in order that scattering would be observed form an entire cross section of the jet and not from a selected portion of it. A study of the physical characteristics of the growth zone confirmed previous observations concerning the shape of the condensation region under conditions of laminar flow. Using helium as a carrier gas, isothermal profiles were obtained, and by insertion of a thermocouple junction into the growth zone, it was possible to determine to within a degree or two the temperature of the isothermal profile. Moreover, assuming saturation for the carrier gas, it was possible to compute the supersaturation ratio for heterogeneous nucleation of dibutyl phthalate on sodium chloride. Regarding the kinetics of growth, graphical representations on which the ratio of modal size in the growing aerosol assembly to the final modal size in the growing aerosol assembly to the final modal size at time t equal to infinity plotted versus time, are given along with the breadth parameter as a function of the modal size ratio. The trends of bot the above functions were finally assessed from a sequence of particle size distribution plots covering the history of the aerosol during its first 200 m sec.

21624 APTIC NO. 40122

Simonaitis, R. and Julian Heicklen

KINETICS AND MECHANISM OF THE REACTION OF O(3P) WITH CARBON MONOXIDE. *J. Chem. Phys., 56(5):2004-2011, March 1, 1972. 23 refs.*

The mercury-photosensitized decomposition of nitrous oxide to produce ground state oxygen atoms (O(3P)) was studied in the presence of mixtures of carbon monoxide and 2-trifluromethylpropene (TMP) at 298, 383, and 472 K in order to determine the relative rate constants for the reaction of ground state oxygen atoms with the two gases. The absolute value of the rate constant with TMP was 9.1 times 10 to the 9th power exp (-2200/RT)/M/sec from a similar competitive study at the same temperatures between TMP and butene-1, whose rate constant with ground state oxygen atoms is relatively well known. The absolute value for the ground state oxygen atoms plus carbon monoxide reaction was thus determined, and it depended on pressure. The reaction was intermediate between second order and third order. For any pressure, the reaction became more nearly second order as the temperature rose. Expressions were obtained for the limiting low and high-pressure rate constants, and a mechanism was proposed to interpret these results.

21625 APTIC NO. 40775

Sumner, David

ON TESTING THE SENSE OF SMELL. *Lancet, no. 7262:895-896, Nov. 3, 1962. 8 refs. (Presented at the North of England Neurological Association, Inaugural Meeting.)*

The ability of 200 subjects (150 outpatients at a neurologic clinic and 50 doctors, nurses, or medical students) to smell nine conventional and three rarely-used test substances was compared. There was an almost inverse relationship between the frequency with which a test substance is used in neurologic and nsurosurgical units and the ability to identify it. Substances with the highest indentification rates were coffee (82%), benzaldehyde (almond) (72%), tar (63%), and oil of lemon (57%). In testing the sense of smell, more use should be made of these substances or others that can be identified at least as readily.

21626 APTIC NO. 39978

Tereshchenko, L. Ya., V. P. Panov, and M. Ye. Pozin

CONTRIBUTION TO THE CALCULATION OF EQUILIBRIUM CONDITIONS AND INTERACTIONS OCCURRING BETWEEN NITROGEN OXIDES AND NITRIC ACID WATER SOLUTIONS. *(K voprosu o raschete usloviy ravnovesiya i protsessov zvaimodeystviya okislov azota s rastvorami H2O-HNO3). Text in Russian. Zh. Prikl. Khim., 45(1):186-189, 1972. 3 refs.*

Formulae describing the equilibrium pressures of nitric oxide and nitrogen dioxide as a function of temperature and the concentration of the nitric acid are given. The formulae permit calculations to be carried out with a relative error of 3%, maximum. The formulae can be used for the determination of the equilibrium concentration of nitric acid and nitrogen oxides of a given composition at definite temperatures, the equilibrium partial pressure of nitric oxide and nitrogen dioxide above nitric acid of given concentration, the temperature required for equilibrium conditions, of the sense of the reactions between nitrogen oxides and nitric acid water solution under definite conditions, the oxidation degree, the theoretically possible degree of nitrogen oxides HNO_3 conversion, and the equilibrium lines.

21627 APTIC NO. 40413

Tereshchenko, L. Ya., V. P. Panov, and M. Ye. Pozin

OXIDATION OF NITRIC OXIDE BY NITRIC ACID AS AFFECTED BY THE COMPOSITION OF THE GAS MIXTURE. *(O vliyanii sostava gaza nax okisleniye okisi azota azotnoy kislotoy). Text in Russian. Zh. Prikl. Khim., 45(2):241-245, 1972. 3 refs.*

Investigations on the oxidation of nitric oxide by nitric acid of various concentrations in a bubbler at a temperature range of 20-60 C are described. A rise of the NO concentration from 3% to 20% caused the rate of oxidation to increase 3-4 times with decreasing degree of oxidation. The rate of oxidation was determined primarily by the diffusion resistance of the gaseous phase, though the effect of the liquid phase was also considerable. The rate of oxidation was determined by chemical reactions occurring within the liquid phase at low tempertures (20-40 C), where constant rate of oxidation in spite of varying gas concentration was observed. When the process was in the diffuse range, the efficiency was practically independent of both nitric oxide concentration in the gaseous phase and the degree of oxidation. The oxidation of the nitric oxide was an effective means of increasing the total nitrogen content of the gas. A strong effect of the degree of oxidation on the rate of oxidation was observed. To obtain a high degree of oxidation for the nitric oxide, both high-concentration nitric acid and high temperature were required. Oxygen in concentrations from zero to 20% by volume left the character of the relationship between temperature, nitric acid concentration, and gas composition unaltered, but it slightly reduced the rate of oxidation. The results suggest the possibility of oxidizing nitric oxide by means of low-concentration nitric acid at high rates even at considerable initial oxidation degree of the gas, and in the presence of oxygen.

21628 APTIC NO. 40242

Tilford, S. G., R. A. Howard, and M. L. Ginter

FLUORESCENCE OF CARBON MONOXIDE EXCITED BY THE 1306-A OXYGEN RESONANCE LINE. *J. Chem. Phys., 56(3):1413-1415, Feb. 1, 1972. 4 refs.*

A study of the fluorescence of carbon monoxide exicted by the 1306 A oxygen resonance line revealed several overlapping bands of the CO Fourth Positive System occurring on the same plates used in a recent analysis of the 3A bands of carbon monoxide. On these high resolution emission spectrograms, one single line appeared anomalously intense in all bands with v prime equal to 9 for the (9-17), (9-18), and (9-19) bands. A critical review of the other known electronic states of carbon monoxide in this region indicates that no known state of CO can be responsible for this enhancement. Thus, the high intensity of the Q(22) transition results from pumping of Q(22) in A-X (9-0) by the 1306 A line of OI. Verification of the 1306 angstrom OI line was accomplished by investigating the effect of CO on the intensity of the OI triplet excited in a low pressure microwave lamp. The 1306 A line clearly exhibited a much greater reduction in intensity upon the addition of CO into the absorption path than the other two members of the OI multiplet. Selective excitation by producing the multiplet in a high temperature source will provide a mechanism important in the scattering of solar radiation from planetary atmospheres containing appreciable concentrations of CO.

21629 APTIC NO. 40121

Tracy, J. C.

STRUCTURAL INFLUENCES ON ADSORPTION ENERGY. III. CO ON CU(100). *J. Chem. Phys., 56(6):2748-2754, March 15, 1972. 10 refs.*

Carbon monoxide adsorption on copper (100) was completely reversible over the temperature range 77-300 K and pressure range 10 to the minus 8th power to 10 to the minus 4th power torr using LEED and work function measurements. The isosteric heat was determined as a function of coverage, and strong correlations were found with surface structural changes. An in-registry to out-of-registry transition was observed at 0.5 monolayer suggesting once again that localization on high coordination substrate sites may not be so important as commonly believed. (Author abstract)

21630 APTIC NO. 40174

Tracy, J. C.

STRUCTURAL INFLUENCES ON ADSORPTION ENERGY. II. CO ON NI(100). *J. Chem. Phys., 56(6):2736-2347, March 15, 1971. 18 refs.*

The adsorption of carbon monoxide on nickel(100) was studied using LEED, Auger, and work function measurements; it was completely reversible. The isosteric heat of adsorption was approximately 1.30 eV/molecule independent of coverage up to 0.61 monolayers. Three surface structures were observed: a disordered phase at high temperature and/or low coverage; a c(2 by 2) phase at coverages up to and including 0.5 monolayers at sufficiently low temperature; and a compressible hexagonal phase between 0.61 and 0.69 monolayers. Evidence is presented which supports an attractive CO-CO interaction at coverages of less than 0.5 monolayers. A number of two-dimensional phase transitions were observed and suggest an interesting T-theta phase diagram with a eutecticlike triple point. The importance of scrupulous cleaning procedures in allowing all possible adsorbed phases to be observed has again been demonstrated. (Author abstract modified)

21631 APTIC NO. 40156

Tyler, R. J. and H. J. Wouterlood

PHYSICAL ADSORPTION OF CARBON DIOXIDE ON GRAPHON. *Carbon, 9(4):467-472, Aug. 1971. 17 refs.*

Adsorption isotherms of carbon dioxide on Graphon have been determined at temperatures from minus 80 C to plus 29 C and equilibrium pressures up to 30 atm. Plots of log (fugacity) against 1/T at constant amounts adsorbed are linear over the temperature range, showing no change in slope in the region of the triple point of bulk carbon dioxide. With increasing amount adsorbed, the isosteric heat of adsorption increases to a maximum of 4.5 kcal/mole and then declines. Similar behavior is shown by carbon dioxide adsorbed on partly combusted specimens of Graphon. Assuming that the maximum heat of adsorption occurs on completion of the first adsorbed layer, the average area of surface occupied by each carbon dioxide molecule at this point is 26 sq A. The effect of oxygen previously chemisorbed on the carbon surface is to increase the amount of carbon dioxide absorbed at minus 80 C. This effect was studied gravimetrically. The extra amount adsorbed rises with increasing pressure of CO_2 to a value corresponding to the adsorption of an extra CO_2 molecule for each 3-5 oxygen atoms on the surface.

21632 APTIC NO. 40692

Volkovitskiy, O. A. and V. N. Poddubnyy

APPROXIMATE FORMULAE FOR THE EVALUATION OF TEMPERATURE CHANGES OCCURRING IN CLOUD CHAMBERS FOLLOWING A DECREASE IN PRESSURE. *(Priblizhennye formuly dlya otsenki izmeneniya temperatury v oblachnykh kamerakh pri ponizhenii davleniya). Text in Russian. Tr. Inst. Eksp. Meteorol., no. 20:65-71, 1971. 5 refs.*

The applicability of formulae for the evaluation of temperature changes occurring in cloud chambers following a decrease in pressure was extended to a negative temperature range of 233-273 K and humidities equaling or below 100%. The formula for temperature changes following a pressure drop from 1,500 to 500 mb at 100% humidity, and heat transfer from chamber walls equaling zero, has an error of 3-4%. The temperature change for humidities below 100% is determined for adiabatic process. The formula derived for temperature changes with wall heat transfer differing from zero is in good accordance with experiments for low pressure changes. The heat transfer coefficient, determined in experiments, is about 0.0015. The effect of the heat transfer from the chamber walls is much faster in thermal than in aerosol chambers.

21633 APTIC NO. 39913

Vollmann, Heinrich, Hans Becker, Martin Corell, and Hans Streeck

CONTRIBUTIONS TO KNOWLEDGE ON PYRENE AND ITS DERIVATIVES. *(Beitraege zur Kenntnis des Pyrens und seiner Derivate). Text in German. Justus Liebigs Ann. Chem., vol. 531:1-159, 1937. 106 refs*

Experiments carried out to study the substitution rules in the pyrene molecule are described. Monosubstitution of the pyrene system occurred readily and exclusively at the third carbon atom. Direct disubstitution occurred easily producing 3,8 and 3,10- derivatives with higher and lower melting points, respectively. Direct trisubstitution occurred only in the 3,5,8 position. Direct tetrasubstitution led to 3,5,8,10 pyrene derivatives quantitatively. Higher pyrene substitution with chlorine occurred following substitution on the 3,5,8 and 10 position, at the 1,2,6,7 carbons and, finally, at the 4,9 position. Methods for the indirect preparation of 1 or 4- pyrene derivatives are described. The coupling properties of 1-oxy and 4-oxy-pyrene derivatives as opposed to the 3-oxy-pyrene derivative are emphasized. New classes of dyestuffs were derived from suitably substituted pyrene-3,8-quinones and 1,8,4,5-naphthalene tetracarbonic acid diimides. The valency distribution throughout the pyrene molecule is discussed.

21634 APTIC NO. 40017

Zalmanzon, Yu. Ye., V. I. Nikitin, and O. A. Chutkin

A STUDY OF THE DISTRIBTUION OF A RADIOACTIVE AEROSOL IN A MODEL PREMISE. *(Issledovaniye raspredeleniya radioaktivnogo aerozolya v model nom pomeschenii). Text in Russian. Gigiena i Sanit., 37(2):47-51, 1972. 6 refs.*

The distribution of a radioactive aerosol (ammonium bromide) was studied by activity measurements in an enclosed room with and without ventilation. The sampling rates for individual and stationary samplers were 0.9 + or 0.1 l/min and 120-170 l/min, respectively. The concentration values obtained by means of stationary samplers were strongly influenced by both the location and minor displacements of the emission source even in small rooms. The concentration distribution practically followed the air currents, and the vertical and horizontal point-by-point variations lay in ranges of 20-90% and 36-90%, respectively. The relationship between the deviation from the mean concentration and the probability of obtaining concentration values within a given deviation range by single measurements was established. Thus, the number of measurements, required to obtain mean concentration data with a given accuracy, can be determined. If the error for the mean concentration lies at + or 50%, the probability of obtaining a value within the deviation range by single measurement is 0.72. The effect of the sampling rate on the obtained concentration value was confirmed. The readings for sampling rates, differing from each other by a factor of 100, differed, on an average, by a factor two.

21635 APTIC NO. 40767

Zatsiorskiy, M., V. Kondratyev, and S. Solnyshkova

SPECTRUM OF THE CARBON MONOXIDE PLUS OZONE COMBUSTION FLAME AND MECHANISM OF THE REACTION. *(Izlucheniye plameni CO+03 i mekhanism etoy reaktsii). Text in Russian. Zh. Fiz. Khim., 14(12):1521- 1527, 1940. 8 refs.*

An analysis of ultraviolet and visible spectra of carbon monoxide combustion in ozonized oxygen at 150-250 C revealed that the spectrum is identical with a spectrum of a normal CO flame. The absolute magnitude of light yield in a CO flame was measured as a function of temperature and a rapid increase of light yield with temperature was observed. It is shown that the only process promoting the excitation of the CO2 molecule is the reaction occurring between CO and atomic oxygen where 126 cal are released. To explain the temperature dependence of light yield, another process of CO2 formation has to be included in the mechanism of CO combustion, i.e., direct reaction of CO with ozone. From the temperature dependence of light yield, the activation energy of the process was determined to be 8 cal.

EFFECTS-HUMAN HEALTH

21636 APTIC NO. 40047

Committee of Investigation on Effects of Soot and Smoke, Chiba (Japan)

REPORT OF INVESTIGATION ON PREVALENCE OF RESPIRATORY SYMPTOMS IN CHIBA CITY: FROM COMMITTEE RESEARCH ON EFFECTS OF SOOT AND SMOKE, MARCH 1972. *(Chiba-shi ni okeru kokyukishojo yusho-ritsu chosa hokoku-sho (showa 47 nen 3 gatsu hokoku)). Text in Japanese. 47p., March 1972.*

Investigations were performed by using a questionnaire for respiratory symptoms. In 11 towns in the industrially polluted area in Chiba City, 1/8 of the inhabitants of both sexes who had lived there for more than 3 years (aged 40 to 59), 278 males and 304 females, were taken as subjects. One-fourth of inhabitants in nine towns of a non-polluted area, 98 males and 113 females, were selected and compared as control groups. The return rates reached 86.7% for males and 94.7% for females in the test group and 95.9% for males and 88.5% for females in the control group. The prevalence of respiratory symptoms classified by sex and age were highly significant in the polluted area for almost all the items. Comparing the results with data of the central areas in Kawasaki City, Fuji City, and Yokohama City, which were recently obtained by the same method, rates of polluted areas in Chiba City were higher for almost all the items. A comparison with the data from the area designated by the Relief Law for Environmental Pollution Sufferers in Kawasaki and Yokohama Cities in 1971 showed some cases more serious than those in two cities.

21637 APTIC NO. 40423

WHAT HAPPENED IN PROVIDENCE VALLEY? AN EPIDEMIC? HYSTERIA? Med. World News, 13(1):18-20, March 10, 1972.

Doctors are at odds over whether a community has had an epidemic and whether environmental pollution was the cause. Forty persons from Providence Valley, Maryland were hospitalized for pancreatic damage in and around 1969. A local chemical company that handles organic solvents was blamed. Sixteen compounds were detected in the air of Providence Valley. Only benzene and tetrachlorethylene were found to approach the threshold limits of the American Conference of Governmental and Industrial Hygienists. These standards apply to industrial workers exposed only 8 hr/day.

21638 APTIC NO. 40485

ANALYSIS OF THE BIOSPHERE POLLUTION WITH LEAD AND ITS BIOMEDICAL ASPECTS. *(Analyse de la situation de pollution de la biosphere par le plomb et aspects bio-medicaux). Text in French. Protectio Vitae, no. 1:31-33, 1971.*

Under present conditions, lead concentration in gasoline can vary from 0.2 to 1.1 g/l, with an average of 0.44 g/l. Total emission of lead from automobile exhausts in the Northern hemisphere amounts to several hundred thousands of tons per year. Concentrations of lead in the air in cities and near open roads with heavy traffic can reach as much as 40 micrograms/cu m. The World Health Organization considers a lead concentration of more than 2 micrograms/cu m in breathing air as objectionable, and suggests a permissible limit of 1 microgram/cu m. In rain water, as much as 300 micrograms lead/l have been found quite frequently, and accumulations of 1000 micrograms/sq m on the ground are not unusual. By means of radioactive isotopes of lead, information has been obtained on the mode of absorption, distribution, and retention of lead in the human body and its organs. Daily elimination removes a certain percentage of the quantities absorbed by digestion. The presence of lead can disturb the metabolic functions of the blood, central nervous system, liver, kidneys, and other organs. Tetraethyl lead, used as antiknock agent in gasoline, has particularly toxic properties. It penetrates preferentially into the central nervous system and can diffuse through intact skin. Symptoms of poisoning are troubled sleep, impaired vision, cramps, and drop of blood pressure. So far, the chemical and petrochemical industries have not found a product that can replace tetraethyl lead as an antiknock agent, despite the fact that some 200,000 chemical compounds have already been investigated.

21639 APTIC NO. 40443

Aoyama, Mitsuko and Tsuruo Rokushika

INVESTIGATION OF AIR POLLUTION AND HEALTH OF PUPILS IN NAGOYA DISTRICT. *(Nagoya shi ni okeru taiki osen to jido seito no kenko to no kankei). Text in Japanese. Taiki Osen Kenkyu (J. Japan Soc. Air Pollution), 6(1):150, 1971. (Presented at the National Council Meeting of Air Pollution Studies, 12th, Nagoya, Japan, Oct. 27-29, 1971.)*

The effects of air pollution on the health of schoolchildren were investigated for 25,537 students from 25 grade schools and 17 junior high schools in Nagoya City. Forty percent of the students were self-conscious of the pollution in their school area, with a higher percentage in the southern industrial area. Complaints on the offensive smell were 68%, and higher in industrial areas as well. About 20 to 30% of the students had symptoms of respiratory diseases including bronchitis. A higher percentage of students with tonsilitis was found in the southern industrial area. The ability of endurance of running was higher for students at relatively nonpolluted schools.

21640 APTIC NO. 39825

Ashe, William F.

ACUTE EFFECTS OF AIR POLLUTION IN DONORA, PENNSYLVANIA. *Interdepartmental Committee on Air Pollution, Washington, D. C., Air Pollut., Proc. U. S. Tech. Conf., Washington, D. C., 1950, p. 455-461. (May 3-5, Louis C. McCabe, ed.)*

Industries on the Donora side of the bank of the Monongahela River in western Pennsylvania, include a slag processing operation, zinc smelter and sulfuric acid plant, wire mill, rod mill, blooming mill, 13 open hearth steel furnaces, and two blast furnaces. The meterologic conditions are normally such that air is well cleaned in the valley during the day but stagnates at night. During the week of Oct. 25-31, 1948, air cleaning in Donora and vicinity became less and less effective. Symptoms produced by the smog in decreasing order of occurrence included cough, sore throat, headache, dyspnea, lacrimation, vomiting, nasal discharge, fever, choking, weakness, cyanosis, and diarrhea. Males and females were affected approximately equally in all ages. The percentages of persons affected increased with age from 23.4% of those under 20 yrs to 60.2% of those 55 yrs and older. Of an estimated 5910 persons affected, 1454 were disabled for a short period and 18 persons died during this period. The fatalities were believed to have been due to serious chronic disease upon which was superimposed smog affection. It was evident that smog was not of lethal intensity for previously normal healthy people.

21641 APTIC NO. 40057

Basecqz, J.-M., R. Lauwerys, and J.-P. Buchet

COMPARATIVE STUDY OF VARIOUS BIOLOGICAL LEAD EXPOSURE TESTS. *(Etude comparative de divers tests biologiques d exposition au plomb). Text in French. Arch. Madadie Profess. Med. Trav. Securite Sociale (Paris), 32(6):453-463, June 1971. 36 refs.*

On the basis of various known biological tests carried out to determine blood and urine lead levels in 2 groups of persons exposed to lead a control group, the validity of the determination of urinary delta-aminolevulinic acid for the determination of lead exposure was confirmed. Its 0correlation with urine-lead was definitely superior to that of coproporphyrinuria. Stippled cells research offers no interest. A significant inhibition of the globular enzyme delta-aminolevulinic dehydratase, however, can occur without increase in the urinary delta-aninolevulinic acid level. Therefore, the determination of the activity of this enzyme proves to be a very sensitive and very early test of lead exposure. Even in subjects nonoccupationally exposed to lead, the enzyme activity depends on the amount of circulating lead. (Author summary modified)

21642 APTIC NO. 40492

Beckert, J., G. Buehlmeyer, F. Unckell, and G. Tech

INVESTIGATIONS CONCERNED WITH SUBJECTS EXPOSED TO LOW CONCENTRATIONS OF LEAD AT WORKPLACES. *(Untersuchungen bei Bleiexponierten mit primaer niedriger Bleikonzentration am Arbeitsplatz). Text in German. Zent. Arbeitsmed. Arbeitsschutz, 21(7):207-213, July 1971. 29 refs.*

The effect of low concentrations of lead on the urine content of delta-aminolevulinic acid (ALA), coproporphyrin (CP) and porphobilinogen (PBG) of 92 printing workers (machine setters exposed to an average lead concentration of 17 micrograms/cu m) was investigated. Despite the low lead concentrations, ALA excretion in 72 persons exceeded the normal values. Normal limits and maximum allowable concentration values are discussed. The average ALA excretion of the workers exposed to lead was statistically significantly higher than that of the controls.

21643 APTIC NO. 40640

Benesch, Ruth E., Nobuji Maeda, and Reinhold Benesch

TWO, THREE-DIPHOSPHOGLYCERATE AND THE RELATIVE AFFINITY OF ADULT AND FETAL HEMOGLOBIN FOR OXYGEN AND CARBON MONOXIDE. *Biochim. Biophys. Acta (Amsterdam), 257(1):178-182, Jan. 26, 1972. 14 refs.*

The ratio of the affinity of hemoglobin for carbon monoxide and oxygen (M) was measured in the presence and absence of 2,3-diphosphoglycerate on solutions of purified adult and fetal hemoglobin. The methods used in preparing the adult and fetal hemolgobins and in preparing mixtures of oxy-hemoglobin and carboxyhemoglobin are described. The results showed that 2,3-diphosphoglycerate has no effect on M in adult hemoglobin or in fetal hemoglobin. It is assumed that 2,3-diphosphoglycerate is not bound by fully oxygenated hemoglobin or by hemoglobin that is fully saturated with CO.

21644 APTIC NO. 40342

Beritic, T., Dunja Beritic, Ana Markicevic, and D. Dimov

ALLERGIC ALVEOLITIS. *(Alergicni alveolitis). Arhiv Hig. Rada i Toksikol. (Yugoslavia), vol. 20:319-384, 1969. 175 refs. Translated from Serbo-Croatian. Leo Kanner Assoc; Redwood City, Calif., 102p., Dec. 1971.*

The current immunological divisions of the allergic affections of the bronchopulmonary system are examined. The elements of the four basic types of allergies are reactions of the specific cells, antigens, antibodies, complements, and mediators or agents of the reactions. The four classes of allergic reactions, i.e., type I or anaphylactic reactions, type II or cytotoxis reactions, type III toxic complex syndrome, and type IV late or tuberculin reaction, are examined in detail. Allergic alveolitis is presented as a pathogenetic entity which includes a variety of etiologically different occupational diseases. Data on 12 etiological variants of allergic alveolitis are presented, with specific emphasis on farmer s lung disease as a pathogenetic model for the other variants. (Author abstract modified)

21645 APTIC NO. 39832

Blum, Harold F.

EFFECT OF LOSS OF SUNLIGHT ON HUMAN HEALTH. *Interdepartmental Committee on Air Pollution, Washington, D. C., Air Pollut., Proc. U. S. Tech. Conf., Washington, D. C., 1950, p. 499-502. (May 3-5, Louis C. McCabe, ed.)*

Although sunlight between 0.32 and 0.29 micron is the part of the spectrum which activates provitamin D in human skin, most vitamin D is obtained by supplementing the diet and the loss of this portion of sunlight should therefore be of little concern. Air pollution may be beneficial in reducing skin cancer in man by reducing ultraviolet exposure. At present, no clear-cut evidence is available of any other directly beneficial effects of sunlight in man. The possible bactericidal effects of sunlight are considered.

21646 APTIC NO. 40697

Borghetti, A., A. Cavatorta, A. Dal Canton, I. Franchini, T. M. Neri, and A. Novarini

BIOLOGICAL INDICIES FOR THE EPIDEMIOLOGICAL STUDY OF LEAD POISONING. *(Elaborazione di indici biologici per rilievi epidemiologici nella esposizione saturnina). Text in Italian. G. Clin. Med. (Bologna), 52(3):234-246, 1971. 8 refs.*

Urinary excretion studies in normal and lead-poisoned subjects show that the mg of certain urinary solutes/ml urine, divided by the urinary osmolarity, is correlated with the mg of those solutes/ml urine times the urinary minute volume. This was true for creatinine, gamma-aminolevulinic acid, coproporphyrin, and lead. These correlations may be useful in epidemiological studies of lead poisoning. (Author abstract modified)

21647 APTIC NO. 40241

Bouffant, L. Le, J. C. Martin, and S. Durit

THE IDENTIFICATION OF MINERAL PARTICLES IN HISTOLOGICAL SECTIONS BY DIFFRACTION OF X RAYS AND THE PROBLEMS POSED BY THE OBSERVATION OF MICROSCOPIC PARTICLES OF ASBESTOS. *(L identification des particules minerals dans les coupes histologiques par diffraction de rayons x. Problemes poses par l observation des particules microscopiques d amiante). Text in French. Poumon Coeur (Paris), 25(3):299-305, 1969. 3 refs.*

The diffraction of X-rays is generally necessary together with electron microdiffraction for the identification of exogenous or endogenous mineral particles in biological tissues. The method used in this context is applied to the whole of a histological section. The section is first incinerated and then the ash is placed in the form of a cylinder of at least 0.01 m cu m in volume. The preparation is placed in the beam of a X-ray tube in its most powerful part. The diffraction pattern is recorded on a photographic plate, in a ring form, the diameter of which is related to the crystalline characteristics of the particles. In this way the nature of the minerals in the section is determined. This method is particularily well suited to the search for mineral particles in the lungs. In this way the presence of quartz may be shown in histological sections from silicotic lungs. The dust of asbestos occurs in the form of fibrous thread like particles. Some respirable particles reach considerable lengths, greater than 10 micron with an extremely small diameter about 1/10 of a micron. For this reason they cannot be visualized with the optical microscope and the electron microscope must be used to detect them.

21648 APTIC NO. 39794

Buell, Philip, John E. Dunn, Jr., and Lester Breslow

CANCER OF THE LUNG AND LOS-ANGELES-TYPE AIR POLLUTION. PROSPECTIVE STUDY. *Cancer (Philadelphia), 20(12):2139-2147, 1967. 12 refs.*

Questionnaires on cigarette smoking status, residence history and other characteristics were mailed to men of the California Division of the American Legion. Subsequent checking of this population against the California mortality records for 1959 through 1962 disclosed the numbers of deaths, including those due to cancer of the lung and provided 336,571 man-years of observation. The pulmonary cancer gradient by smoking level was less pronounced than that found in other studies. The two major metropolitan areas, Los Angeles and Bay Area plus San Diego, had higher mortality rates for cancer of the lung than remaining mixed rural and urban counties and these differences were relatively greater among nonsmokers, a confirmation of other reports that urban residence carries a risk of pulmonary cancer. With controls for smoking and length of residence, the risk of pulmonary cancer in Los Angeles, where photochemical air pollution levels are highest, was not greater than in other major metropolitan areas of California. (Author abstract modified)

21649 APTIC NO. 40229

Buell, Philip and John E. Dunn

RELATIVE IMPACT OF SMOKING AND AIR POLLUTION ON LUNG CANCER. *Arch. Environ. Health, vol. 15:291-297. Sept. 1967. 24 refs. (Presented at the American Academy of Occupational Medicine, Annual Meeting, 19th, San Francisco, Calif., Feb. 9, 1967.)*

The etiologic roles of urban living and cigarette smoking for lung cancer seem each to be complete in that the urban factor is evident when viewing nonsmokers exclusively, and the smoking factor is evident when viewing rural dwellers exclusively. For the most part, the exposures to whatever agents play a role in carcinogenesis from either source are continuous: either separately as in the noncigarette smoking urban dweller and the rural cigarette smoker; or concurrently as in the urban cigarette smoker. If a third factor representing an occupational carcinogenic exposure is added, the possible interactions become even more complex. The question of how the etiologic agents interact is important, particularly in the face of widespread habituation to cigarette smoking and the steep risk gradient associated with the rate of consumption. The literature on occupational factors gives no clear indication of whether the etiologic factors interact with smoking in a competitive, additive, or multiplicative way. The literature on air pollution is inconsistent, and an argument against the multiplicative hypothesis is presented. The importance of a second factor would be suppressed if interaction with cigarette smoking were competitive, minimized if the interaction were additive, and maximized if the interaction were multiplicative (Author conclusions modified)

21650 APTIC NO. 39880

Campbell, J. S.

ACUTE MERCURIAL POISONING BY INHALATION OF METALLIC VAPOUR IN AN INFANT. *Can. Med. Assoc. J. (Toronto), vol. 58:72-75, Jan. 1948. 4 refs.*

In the case described, a 4-month-old female child was admitted to the hospital with a diagnosis of lobar pneumonia. It was later learned that the child had inhaled mercury vapor. Chief symptoms were dyspnea and episodes of irritable behavior suggesting colic. General appearance was pale and slightly cyanotic. Renal insufficiency and pulmonary edema led to death. Autopsy findings showed generalized edema, pulmonary edema, greatly dilated right ventricle, and grayish necrotic appearance of the mucosa of stomach and duodenum in keeping with the history of mercurial poisoning. Microscopic examination of the kidney showed degeneration of convoluted tubules. The metabolic effects of mercury poisoning are manifest in every tissue. Mercury is well described as a general protoplasmic poison. Experimental evidence indicates that British Anti-Lewisite and the even more effective B.A.L. glucoside, the specific antidotes for poisoning by heavy metals, exert their action through having a greater affinity for heavy metals than do enzyme-proteins.

21651 APTIC NO. 40635

Cavagna G, and G. Bobbio

CHEMICAL AND PHYSICAL CHARACTERISTICS AND BIOLOGICAL EFFECTS OF EFFLUENTS FROM AN ALUMINUM PLANT. *(Contributo allo studio delle charatteristiche chimico-fisiche e degli effetti biologici degli effluenti di una fabbrica di alluminio). Text in Italian. Med. Lavoro (Milan), 61(2):69-101, Feb. 1970.*

In 1932, three years after the Mori aluminum plant at Chizzola in the Italian province of Trento went into operation, school children observed round skin spots of a bluish color. By 1937, 786 such cases (the vast majority were children and women) were examined at the local clinic. No symptoms of fluorosis nor an elevated fluorine level in urine were observed. Bioptic examination of the cutaneous lesions revealed a great variety of different manifestations among them congestion of the deep dermo-hypodermic blood vessels, perivasal edema, and diapedesis of neutrophile granulocytes. After 1937, the phenomenon disappeared only to reappear again in July 1965. At Ziar and Hronom in Czechoslovakia another eluminum plant emitting times the amount of fluorine did not produce this phenomenon, even though fluorosis there was frequent. Also the Rheinfelden aluminum plant in Germany whose fluorine emission is 23 times that of the Mori plant did not produce the above phenomenon. To relate the appearance of the skin spots to fluorine emissions, dust from the Mori electrofilter was fed and injected subcutaneously to rats, mice, guinea pigs, and rabbits and the biological effects were studied by examining their capillary fragility. None of the anatomical, pathological, and biochemical parameters determined showed any difference between experimental and control animals. Thus, in the absence of any other explanation the phenomenon must be ascribed to the toxic or toxic-allergic effect of hydrofluoric acid and fluorides. Chemical analysis of the dust disclosed the presence of many elements in trace quantities, none of which could be relevant to the phenomenon.

21652 APTIC NO. 40108

Clemmesen, Johannes

BRONCHIAL CARCINOMA - A PANDEMIC. *Danish Med. Bull., 1(2):37-46, April 1954. 36 refs.*

An increased incidence of bronchial carcinoma in Denmark during the last decades is observed for men on the basis of several series of health statistics, while the increase in mortality from lung cancer among women cannot be demonstrated in Holland, Norway, and Denmark. Nothing has been found in the Danish material in justification of the assumption of an effect of town air favoring the development of bronchial carcinoma. Within Copenhagen, which has very clean air for its size, bronchial cancer among men shows a distribution very much like cervical carcinoma in women, being more frequent in districts with lower house rent, regardless of their location in the city. Age distribution and the increased incidence of bronchial carcinoma, the average minimal period of exposure, prognosis of the increase in cases, etiologic factors, and prevention are discussed. Inquiries show a higher number of heavy smokers among patients with bronchial carcinoma than among the control persons. Bronchial carcinoma also shows increased frequency among workers in certain types of industries.

21653 APTIC NO. 39944

Clifton, Marjorie

HEALTH, WEATHER AND THE URBAN SCENE. *Chest and Heart Assoc., London (England), Hum. Environ. Respir. Syst., Proc., London, England, 1970, 6p. 2 refs. (Oct. 20.)*

Weather conditions and air pollution are closely interrelated. Cold weather, for instance, increases air pollution because of the increased use of fuel for heating. The concept of Degree Days is useful for comparing different periods with respect to air pollution because Degree Days also indicate fuel requirements. A comparison of Degree Days with deaths from respiratory diseases indicates that Degree Days provide a crude analog to air pollution when looking at the epidemiology of respiratory diseases in winter.

21654 APTIC NO. 39799

Cristiani, H. and R. Gautier

EXPERIMENTAL FLUORINE CACHEXIA: CHRONIC ACTION OF SODIUM FLUOROSILICATE IN SMALL DOSES. *(La cachexie fluorique experimentale: effets chroniques de petites doses de fluosilicate de soude). Text in French. Compt. Rend. Soc. Biol. (Paris), 1925:946-948, 1925.*

The chronic action of small doses of sodium fluorosilicate was studied on two groups of guinea pigs. The feed was powdered with two different doses of fine sodium fluorosilicate, in both cases. In the first group of 13 animals, treated with doses of 2 g, deaths occured, on an average, 35 days after the experiment started, with maximum and minimum of 64 and 9 days, respectively. The same symptoms were observed in all animals (loss of weight, cachexia, bulbous lesions). Special symptoms occurred a few days before death in some cases (stiffening of the spinal column, respiration troubles, tremors, and convulsions). The second group of 10 animals was exposed to 1/10 of the above dose. Death occurred, on an average, after 149 days, the maximum and minimum being 553 and 41 days. The cachexia was preceded by loss of weight. Similar symptoms and results were obtained with fluorine contaminated feed collected near aluminum plants.

21655 APTIC NO. 39810

Cristiani, H. and R. Gautier

THE ACTION OF ALKALINE FLUORIDES ON ANIMALS. *(Action des fluorides alcalins sur les animaux). Text in French. Compt. Rend. Soc. Biol. (Paris), 1925:1276-1277, 1925. 1 ref.*

Tests were carried out with sodium and ammonium fluoride powder introduced in the feed of guinea pigs. Sodium fluoride was applied in doses of 2 g/cage of two animals. Deaths occurred, on an average, 54 days after the start of the treatment, with maximum and minimum of 86 and 22 days, respectively. The average weight of the animals increased at the beginning and dropped sharply in the cachexia period. Similar results were obtained with another group of 10 animals, treated in the same manner with ammonium fluoride. Deaths occurred, on an average, on the 58th day of the treatment, the maximum and minimum being 74 and 41 days, respectively. The symptoms observed were the same as in the case of sodium fluoride. Treatments with sodium fluorosilicate led to similar results.

21656 APTIC NO. 39813

Cristiani, H. and P. Chausse.

MINIMUM DAILY AMOUNTS OF SODIUM FLUORIDE CAPABLE OF PRODUCING FLUORINE CACHEXIA. *(Quantites quotidiennes minima de fluorure de sodium capables de produire la cachexie fluorique). Text in French. Compt. Rend. Soc. Biol. (Paris), no.96:842-843, 1927.*

Tests were carried out to determine, separately for each material investigated, the time required for different doses to cause death in guinea pigs. Daily sodium fluoride doses corresponding approximately to 1/10 of the dose caused cachexia which led to death after 2-3 mo, while doses of 1/50 of lethal dose were tolerated fairly well over more than 10 mo, and even the gain in weight was normal. Two animals treated with 1/20 of the lethal dose died after 118 and 98 days, respectively. Feeding experiments with fluorine contaminated feed revealed cachexia appearing during the second or third year.

21657 APTIC NO. 39924

Cristiani, H. and P. Chausse

LATEST OBSERVATIONS ON CHRONIC POISONINGS WITH VERY SMALL SODIUM FLUOROSILICATE DOSES. *(Nouvelles observations sur l intoxication chronique par de tres petites doses de fluosilicate de sodium). Text in French. Compt. Rend. Soc. Biol. (Paris), 1927:843-844, 1927.*

Experiments carried out on guinea pigs with very small doses of sodium fluorosilicate are described. Amounts corresponding to about one-tenth of a lethal dose (0.50 g/kg body weight), admixed to food, caused death on the average after 18 days, without any signs of cachexia. Weight loss was 20%. Doses corresponding to 1/35 the lethal dose caused death after 51 days treatment, while 1/50 to 1/60 the lethal dose killed one animal after 233 days. That animal showed symptoms of fluorine cachexia and a weight loss of 40%. Thus, even small doses of sodium fluorosilicate were found to be much more toxic than sodium fluoride.

21658 APTIC NO. 40532

Dodo, Hidenori and Hitoshi Hasegawa

THE STUDY ON THE EFFECT OF LEAD IN AIR IN KUSATSU, HIROSHIMA CITY. *(Hiroshima-shi Kusatsu chiku ni okeru taikichu-namari no eikyo ni tsuite). Text in Japanese. Hiroshima Igaku (J Hiroshima Med. Assoc.), 25(4):495-497, April 1972. 3 refs.*

The effects of lead in air on health were studied in the Kusatsu district of Hiroshima City, Hiroshima Prefecture. The measurements, including blood and urine levels of lead, hematocrit value, serum protein level, specific gravities of serum and blood, hemoglobin amount, coproporphyrinuria, and basophilic punctate erythocyte count were performed for housewives of Kusatsu district and those of Yamada district as controls. The blood level of lead was 16.5 micrograms/100 g on the average, ranging from 5 to 58 micrograms/100 g in Kusatsu district and the value was higher than in the Yamada district. The urine lead level was slightly higher in Yamada district, 27.6 micrograms/l on the average, and ranged from 9 to 15 micrograms/l. The blood examination revealed three patients with anemia in both districts, which was the result of nutrition or other causes. Among anemia patients, some basophilic punctate erythrocyte positive subjects were found, however, this count was within the normal limit. In Yamada district, three cases of coproporphyrinuria were seen. The average count of basophilic punctate erythrocyte was higher in the Kusatsu district. On the whole, there was no difference between two districts concerning mean values and rates of abnormalities of all items. No subjects had lead poisoning.

21659 APTIC NO. 40292

Dontenwill, W., H. Elmenhorst, G. Reckzeh, H.-P. Harke, and L. Stadler

EXPERIMENTAL STUDIES ON THE ABSORPTION, CIRCULATION AND DEGRADATION OF CARCINOGENIC HYDROCARBONS WITHIN THE RESPIRATORY SYSTEMS. *(Experimentelle Untersuchungen ueber Aufnahme, Abtransport und Abbau cancerogener Kohlenwasserstoffe im Bereich des Respirationstraktes). Text in German. Z. Krebsforsch. vol. 71: 225-243, 1968. 27 refs.*

The retention, distribution, and metabolism of carcinogenic hydrocarbons in the respiratory organs were investigated in hamsters. When true solutions of the carcinogen were administered, the major part of the carcinogen dispppeared from the lungs after two days and from the body after five days. DMBA (9,10-dimethyl- 1,2-benzanthracene) was desorbed from the lungs more quickly than benzo(3-4)pyrene. A small part of the hydrocarbons was excreted in the feces. Of the solutions and suspensions tested, benzo(3-4)pyrene dissolved in Lutrol was resorbed most rapidly and its rate of resorption in sesame oil was almost in the same range. The addition of soot to the Lutrol-benzo(3-4)pyrene solution slightly inhibited the resorption process. Benzo(3-4)pyrene in carboxymethylcellulose-saline suspension and benzpyrene applied with hematite in saline were resorbed considerably slower. Pretreatment of the lung tissues with soot injections or aerosols generally inhibited the resorption of the carcinogens subsequently administered. The disappearance of hydocarbons from the organism of the hamster was due to enzymatic conversion into metabolites. Hematogenous generalization of the carcinogens occurred only minutes after application. The difficulties of the dose-response relations in the production of carcinomas in the lungs as compared with other organs and the various factors which may affect the action of carcinogens in the respiratory tract were also examined.

21660 APTIC NO. 39834

Dorn, Harold F.

STATISTICAL STUDY OF THE ACUTE EFFECTS OF AIR POLLUTION. *Interdepartmental Committee on Air Pollution, Washington, D. C., Air Pollut., Proc. U. S. Tech. Conf., Washington, D. C., 1950, p. 507-511. (May 3-5, Louis C. McCabe, ed.)*

Because the deleterious effects of air pollution upon humans are possibly masked and therefore not recognized, it is only when a more sudden outbreak of morbidity occurs that attention is drawn to the possible connection of ill health and air pollution. Moreover, unless an unusual number of illnesses or deaths occur within a brief period, even acute outbreaks of ill health dissociated with atmospheric contamination may remain unnoticed or be attributed to other causes. A real possibility exists that investigations of acute outbreaks of ill health coincident with unusual atmospheric contamination may result in a serious underestimation of the health hazards of such contamination, especially since such investigations must be conducted some time after the outbreak. Air pollution health effects should be studied before rather than after an acute outbreak. Long-time statistical studies of morbidity in communities with appreciable air pollution and in communities relatively free from air pollution must be conducted if a reliable measure of the effect of air pollution is to be obtained. Studies of the possible effects of air pollution based upon mortality records should supplement rather than substitute for morbidity studies.

21661 APTIC NO. 40386

Drozdz, M., K. Ludyga, S. Jozkiewicz, T. Molska-Drozdz, and Sz. Kosmider

THE INFLUENCE OF FLUE GASES ON THE GLYCOPROTEIN-METABOLISM AND THE ACTIVITIES OF SEVERAL ENZYMES IN THE SERUM AND IN THE LIVER OF GUINEA PIGS. *(Ueber den Ein-*

fluss von Rauchgasen auf den Glykoproteid-Haushalt und die Aktivitaeten einiger Enzyme im Serum und in der Leber bei Meerschweinchen). Text in German. Z. Hyg., 18(3):178-183, March 1972. 28 refs.

The effects of flue gases on the metabolism of proteins and enzymes in the serum and liver of guinea pigs were investigated. The first group of 20 animals served as a control group. The second group of 25 animals was exposed to coal-fired power plant flue gases which were mixed with moisture-saturated air; sulfur dioxide concentration in the gas was 1 mg/cu m. Exposure time, humidity in the exposure chamber and temperature were controlled. A gas mixture of 150 l/min was supplied to the chamber. The third group of 25 animals was used to study the chronic effects of the ammonia derivatives of sulfur oxides and nitrogen oxides. Analyses of the flue gas branched off at the lower part of the power plant stack yielded an average volume concentration of 16.28% oxygen, 0.02% carbon monoxide, 4.2% carbon dioxide, 119.6 mg/cu m nitric anhydride, and 197.0 mg/cu m SO2. Protein decreased in the second group, and the seromucoid, the protein-bound hexamine, and the activity of the aminotransferase dropped while the activity of the aldolase and lactate dehydrogenase increased. The presence of ammonia in the flue gases binds the SO2 and NOx to a large extent, which reduced the toxicity of the gases.

21662 APTIC NO. 39833

Dunning, James M.

EFFECTS ON ORAL STRUCTURES FROM AIR POLLUTION. *Interdepartmental Committee on Air Pollution, Washington, D. C., Air Pollut., Proc. U. S. Tech. Conf., Washington, D. C., 1950, p. 503-506. (May 3-5, Louis C. McCabe, ed.)*

Forty-two etiologic agents have been recorded as producing effects on oral structures, 18 of these agents are dusts and 12 are gases. Some of the agents cause physical damage such as staining or abrasion of the teeth, including copper, nickel, iron, chromium, coal dust, bone, celluloid, sawdust, flour, and tobacco. Chemical damage usually associated with some disease process may result from the heavy metals, fluorine, phosphorus, ionizing radiation, and sugar. Arsenic, chromium, phosphorus, and ionizing radiation produce syndromes characterized chiefly by soft tissue and alveolar necrosis. Bismuth, lead, and mercury greatly aggravate periodontal disease and usually produce gingival discoloration as well. Carbohydrate dust produces adherent plaques on the surfaces of teeth leading in time to dental caries. Most of these agents produce far greater effects upon already diseased oral structures than upon healthy ones.

21663 APTIC NO. 40076

Eastcott, David F.

THE EPIDEMIOLOGY OF LUNG CANCER IN NEW ZEALAND. *Lancet, vol. 270:37-39, Jan. 7, 1956. 5 refs.*

Immigrants to New Zealand from the United Kingdom have a higher incidence of lung cancer than New Zealand-born persons of the same stock. The difference is greater in those who were 30 years or older when they came to New Zealand. This increased incidence is unlikely to be an artefact, for it is not seen in any other of the principal sites for cancer. Moreover, it is the same for women as for men and is consistent at all ages over 35 and for all the principal parts of the country. The chances of dying of cancer of the lung are 30% higher for all United Kingdom immigrants, but for those who were 30 years of age or more on entering New Zealand the risk is 75% higher. The conclusion follows that immigrants from Great Britain to New Zealand are affected by their former environment and that this effect is related to the length of exposure in that environment. Factors of urbanization may exert their carcinogenic effect a long time after the person has been removed from them.

21664 APTIC NO. 40037

Epstein, Samuel S.

ENVIRONMENTAL PATHOLOGY. *Am. J. Pathol., 66(2):352-373, Feb. 1972. 35 refs.*

Basic problems of environmental pathology caused by chemical pollutants are reviewed, especially chronic toxicity in the forms of carcinogenicity, teratogenicity, and mutagenicity. Effects of widespread mutations in a human population are discussed, along with the effects of specific environmental chemical mutagens, including ethyleneimines and trimethylphosphate. Also analyzed are methods for predictive testing and monitoring of adverse human effects and the needs for regulatory measures concerning the introduction of chemical innovations into commerce.

21665 APTIC NO. 40597

Flury, Ferdinand

DEATH CAUSE DURING THE FOG CATASTROPHY OF THE MEUSE VALLEY. *(Die Todesursache bei der Nebelkatastrophe im Maastal). Text in German. Archiv Gewerbepathol Gewerbehyg., vol 7:117-125, 1936. 10 refs.*

The 1930 fog catastrophy in the Meuse Valley is described and an attempt is made to determine the cause of the massive deaths which occurred. The meteorological conditions favored the formation of fog. An inversion at an altitude of 70-80 m and the vertical equilibrium led to persistent smog. The symptoms of irritation of respiratory organs, cough, and dyspnea, indicated local effects. Autopsies revealed congestion and diffuse reddening of mucous membranes in the trachea and bronchus, partial loss of the epithelium, alveolar edemas, and hemorrhagic foci. The death cause was undoubtedly severe pollution due to industrial gases, vapors, and aerosols accumulated in excessively high concentration. While the official statement which made the combustion products of coal sulfur chiefly responsible holds true, the massive deaths cannot be satisfactorily explained from the inhalation of sulfur dioxide and trioxide and sulfuric acid bound in aerosols. Eye irritation was not frequent, and even the specific odor of sulfur dioxide was not present. Heart and circulation troubles in many cases indicated the high probability of the presence of other, resorptive toxic substances in the air. In view of the exceptionally high death toll in villages in the area of a plant emitting hydrofluoric acid at a daily rate of more than 2000 cu m, poisoning due to the inhalation of fluorine compounds may be regarded as most probable.

21666 APTIC NO. 39920

Fujimura, Yutaka

STUDIES ON THE TOXICITY OF MERCURY (HG SERIES NO. 8) 3RD REPORT. ON THE URINARY EXCRETION OF MERCURY AND ITS DEPOSTION IN ORGANS IN NON-EXPOSED MAN. *(Suigin no dokusei ni kansuru kenkyu (Kg Series No. 8) Daisanpo. Seijosha no nyochu Hg haisetsu oyobi zokichu Hg chikuseki ni tsuite). Text in Japanese. Japan. J. Hyg. (Tokyo), 19(1):33-40, 1964. 35 refs.*

Amounts of mercury excreted in normal urine and deposited in normal corpses were determined. Urine mercury levels in 98 nonexposed persons were 9 to 130 micrograms/l, averaging 61.8 micrograms/l. Age, sex, and place of residence had no significant influence on measured levels. Ten persons were observed for 5 days for the daily variation of mercury excretion in urine. The average figures were 47.8 micrograms/day and 41.5 micrograms/l. Individual variations were large but daily variations for a given individual were relatively small. There was a significant correlation between the amount of urine in a 24-hr period and its mercury content. Body mercury levels in 10 victims of sudden death in Tokyo were: kidneys, 0.6 ppm; liver, 0.4 ppm; pancreas, 0.16 ppm. While individual variations were large, there was no indication that mercury concentrations increased with age. These findings provide good criteria for evaluating the present status of mercury contamination in Japan.

21667 APTIC NO. 39883

Fullerton, Pamela M.

TOXIC CHEMICALS AND PERIPHERAL NEUROPATHY: CLINICAL AND EPIDEMIOLOGICAL FEATURES. *Proc. Roy. Soc. Med., vol. 62:201-204, Feb. 1969. 29 refs. (Presented at the Royal Society of Medicine, Joint Meeting of Section of Occupational Medicine with Section of Neurology, May 9, 1968.)*

Clinical and epidemiologic features of peripheral neuropathy caused by toxic substances encountered in industry are reviewed, classified by their main toxic effect. Peripheral neuropathy predominates with lead, acrylamide, organophosphates, and thallium, while central nervous system involvement predominates with carbon disulfide, methyl mercury, and methyl bromide. Effects appear only after gross overdose of arsenic, trichloroethylene, tetrachloroethane, 2,4-D (dichlorophenoxyacetic acid), pentachlorophenol, and DDT. Other systems are more affected by carbon tetrachloride and carbon monoxide. Criteria for establishing the metabolic toxicity of the substances are indicated as are criteria for implicating an immunologic mechanism in the production of neuropathy.

21668 APTIC NO. 40480

Gaudibert, R.

URTICARIA AND QUINCKE S OEDEMA DUE TO MOULDS IN THE ATMOSPHERE. *(Les urticaires et oedemes de quickne aux moisissures atmospheriques). Text in French. Rev. Franc. Allergol., 12(1):21-34, 1972. 9 refs.*

An analysis of 31 cases has confirmed that the presence of molds in the atmosphere may be responsible for chronic cases of urticaria and Quickne edema. The first of these diseases is characterized by hives, rash, and itching of the skin. The edema, also known as angioneurotic edema, is characterized by recurring episodes of noninflammatory swelling of the skin, mucous membranes, viscera, and brain. The importance of the molds, compared with other causes of the diseases, depends on the climate and the developmental conditions of the aeromycological flora. Through clinical tests, it is often fairly easy to establish a relationship between the onset of symptoms and the impact of an allergen. In all cases observed, where the molds were inhaled 30 times, the allergy was immediate. In 55% of the cases, desensitization proved very effective, particularly when the aeromycological flora were not very dense. Removal of the allergen completed the effects of a specific treatment which has always achieved a substantial regression of the diseases, whatever the degree of seriousness. (Author summary modified)

21669 APTIC NO. 40721

Glomme, John

AN EXPERIMENTAL EVALUATION OF THE RELATIVE FIBROGENETIC TENDENCY OF MINERAL PARTICLES IN ANIMALS. *(Valutazione della tendenza relativa fibrogenetica di particelle minerali in esperimenti su animali). Text in Italian. Securitas (Rome), 55(11/12): 959-1108, Nov./Dec. 1970. 114 refs*

A procedure for evaluating the relative fibrogenetic tendency of mineral particles in experimental animals, using quartz-induced dust fibrosis as the standard, was devised. From histological examinations, a grading scale was devised which took into special consideration the tissue changes induced by particles with low or moderate fibrogenetic property. Weighing of the lungs and lymph nodes and measurement of the collagen content in the lungs were statistically significant as parameters in evaluating the fibrogenetic tendency of various particles. Subsequently, the tissue reaction induced by particles other than pure quartz was examined and recorded. Titanium dioxide and glass wool particles induced a modest, predominantly cellular, reaction and were regarded as practically inert from a fibrogenetic point of view. Iron silicate and olivine particles caused a very modest fibrillar development, which was definitely not progressive. These particles were relatively harmless, but may contribute to a certain fibrogenetic reaction, at least when they occur in high concentrations or in combination with infection. Commercial kaolin with 2-4% of quartz caused a tissue reaction which in the main was comparable with that induced by olivine, but a little more pronounced. Dust from the atmosphere in ferrosilicon melting works with a quartz content of 3-6% revealed a moderately fibrogenetic tendency, while kaolin with 15% of quartz gave rise to a somewhat more marked tissue reaction. The standardized procedure may be useful for assessing the potential fibrogenetic property of dusts occurring in the working atmosphere.

21670 APTIC NO. 40602

Gregg, Ian

THE EFFECTS OF AIR POLLUTION AS SEEN IN GENERAL PRACTICE. *Hum. Environ. Respir. Syst., Proc., London, England, 1970, p. 25-32. 4 refs. (Oct. 20.)*

Any source of irritation, whether derived from air pollution or smoking, can cause ill-effects in the respiratory tract. The general practitioner, whose observations are based on a small number of patients living in a single locality should be cautious before assuming existing relationship between air pollution and ill health. However, if air pollution could be eliminated, the incidence of diseases of the respiratory tract, notably chronic bronchitis, would be reduced. Tobacco smoke acts in a similar manner. There are three protective mechanisms of the lower respiratory tract, i.e., the cough reflex which expels the offending irritant; the secretion of mucus by glands within the bronchial glands, thus trapping any particulate matter and preventing its passage further down; and the cilia on the surface of all cells which line the entire respiratory tract. The constant beating of these cilia moves mucus towards the mouth. However, once the normal defense mechanisms have been impaired, usually by smoking, any level of air pollution is a serious potential danger.

21671 APTIC NO. 40355

Grossklaus, Dieter

FOREIGN MATTER AND RESIDUES IN POULTRY MEAT WHICH ARE HARMFUL TO HUMAN HEALTH. *(Fremde Stoffe und gesundheitlich bedenkliche Rueckstaende in Gefluegelfleisch). Text in German. Bundesgesundheitsblatt (Berlin), no. 3-4:42-50, Feb. 4, 1972.*

Because of the lead bromium chloride contained in automotive exhaust gases, environmental lead concentrations, have increased considerably in recent years. Fodder crops near highways were found to contain up to 500 ppm lead. Poultry meat had an average lead concentration of 0.14 ppm in 1969. Continuous accumulation of lead residues in the body may lead to enzyme damage and to mutagenic and teratogenic effects.

21672 APTIC NO. 40634

Gualtierotti, R.

GLOBAL POLLUTION OF THE ENVIRONMENT. *(L inquinamento globale dell ambiente). Text in Italian. Museoscienza, 12(1):23-34, Jan. Feb. 1972.*

Seventy percent of the oxygen of the biosphere is produced by marine phytoplankton which is being endangered by all types of environmental pollution. Only if the biosphere remains in the equilibrium which it attained five million years ago and which is now in acute danger can man survive. While each human consumes daily 14 kg of air, the combustion of each liter of gasoline uses up 16.5 kg air and the combustion of 1 kg of methane uses up 18 kg air. The current yearly emission of carbon dioxide, hydrocarbons, and nitrogen oxides into the atmosphere is estimated to amount to 142 million tons in the U.S.A. alone. When automobile emissions are exposed to sunlight smog formation results. Air pollution can have an acute or a chronic effect on living organisms. The former is manifested in humans by violent retrosternal pain, dyspnea, cough, vomiting, pulmonary edema, collapse, and death. The latter affects primarily the respiratory tract by inducing chronic bronchitis, spastic manifestations, pulmonary emphysema, and cor pulmonale. Hydrocarbons and benzopyrene, in particular, cause lung cancer, which is also indirectly caused by tetraethyl lead. Both these compounds and carbon monoxide have a deleterious effect on enzymes operative in respiration. Air pollution is estimated to be a contributory factor in the induction of tumors of the respiratory tract by 10%, in asthma by 10%, in congestive myocardial insufficiency by in acute infections of the upper respiratory tract by 10%, in acute bronchopneumopathies by 15%, in chronic bronchitis by 20%, in pylmonary abscesses by 10%, in pulmonary congestion and hypostasis by 5%, and in other diseases of the respiratory tract by 10%. The difference in mortality between 10.6 per mille in urban areas and 9.6 per mile in rural areas can be attributed to congestion as a factor of environmental pollution. Also, urban infant mortality is elevated. Mortality and morbidity attributable to air pollution involve mainly diseases of the respiratory tract and of the cardiocirculatory system. Of the 217 pollutants identified in the atmosphere by gas chromatography, tetraethyl lead has increased most, 70 times in the last 20 years.

21673 APTIC NO. 40231

Haddow, A. J.

THE FUTURE AND LUNG CANCER. *Health (London), 7(2):23-25, 1970. (Presented at the Chest and Heart Association Conference, Glasgow, Scotland, April 17, 1970.)*

The impact of lung cancer on the population in Scotland has c5hanged enormously during the present century as evidenced by a 52-fold increase in mortality attributed to lung cancer among males and an 11-fold increase among females during the period 1911-1966. Significantly, the mortality rate for men and women was roughly the same until the late 1920 s. The disproportionate increase differential in lung cancer mortality between the two sexes observed from 1930 onwards is attributed to the pattern of cigarette smoking developed during the war years and particularly in the army among males. This 5:1 differential between male and female mortality also diminishes the argument that urban atmospheric pollution is a major factor in the overall increase in lung cancer. Virtually all the evidence, varied as it is, points to a 20 to 30-fold greater probability of death due to lung cancer for people who smoke 20 cigarettes per day or more as compared to non-smokers.

21674 APTIC NO. 40022

Haley, Thomas J.

SATURNISM, PEDIATRIC AND ADULT LEAD POISONING. *Clin. Toxicol., 4(1):11-29, March 1971. 130 refs.*

There are numerous differences between the two forms of active plumbism. Pica and lead fumes are the usual cause of pediatric variety, whereas poor industrial hygienic practices produce adult plumbism. The pediatric disease involves hematological, gastrointestinal, and neurological symptoms, and the latter include drowsiness, coma, and grand mal seizures. Brain damage has implicated impedence of brain hemodynamics with changes in both white and gray matter. Adult plumbism requires more time for its development and presents a nonspecific symptom complex with low hemoglobin, gastrointestinal upsets, and increased delta aminolevulinic acid and coproporphyrin in the urine. There may be basophilic stippling and lead line on the gums, but these indications should not be used as sole diagnostic aids. With further development of the disease, the neuromuscular involvement becomes pronounced and in those instances where females are involved, sterility and abortion have been observed. The most valuable diagnostic aid is the determination of blood and urine lead levels, but only by a competent laboratory. The edetate lead mobilization test is also valuable. Therapy for pediatric plumbism includes intravenous edetate to remove blood lead and either urea or mannitol to reduce cerebral edema. Corticosteroids have also been used. In the adult form of the disease, edetate is also effected and in its absence, penicillamine can be used. Pentetate has been used in Europe, but its damaging effects on the islet cells of the pancreas may make its use questionable. (Author summary)

21675 APTIC NO. 40316

Hasan, Jeddi and Sven Hernberg

INTERACTIONS OF INORGANIC LEAD WITH HUMAN RED BLOOD CELLS. *Work Environ. Health, no. 2:26-44, 1966. 160 refs.*

The simplicity of design of a mature human erythrocyte and its consequences, especially the absence of significant reproductive or regenerative capacity, renders the cell exceptionally vulnerable to deleterious physico-chemical influences, and makes it a sensitive indicator of their occurrence. Thus, interactions of red cells with even minute amounts of lead ions result in measureable alterations of function, particularly in the regulation of potassium and water exchange through the cell membrane. The effects appear also as changes in the osmotic resistance, the mechanical fragility, and in erythrocyte survival time in the circulation. (Author summary modified)

21676 APTIC NO. 39807

Hatch, Theodore F.

SIGNIFICANT DIMENSIONS OF THE DOSE-RESPONSE RELATIONSHIP. *Arch. Environ. Health, vol. 16:571-578, April 1968. (Presented at the New York University Institute of Environmental Medicine, New York, June 25, 1965.)*

An important requirement for a successful program of industrial control of a potentially hazardous physical or chemical agent is that there be available a systematic, quantitative statement of the relationship between magnitude of exposure to the stress agent and the kind and degree of response in a population exposed to that agent. Of concern in fixing the scale of effective dose at the critical site is the quantitative aspect. Is the response related to the intensity of the toxic agent at the critical site, or to the dosage rate, or does it depend on the accumulated amount delivered over time regardless of the rate of supply? In a practical situation it will rarely be possible to measure the actual dose of the damaging agent at the critical site; as a reasonable indicator of dose the magnitude of the stress agent found at some more accessible point in the body or in the external environoment must be accepted. Also of concern are the characteristics of the various portals of entry to the body and the pathways and rates of transport of the agent to various tissues and organs. The physical and chemical state of the agent in the environment must be considered. The dimensions of the response and the need to determine tolerance limits are discussed.

21677 APTIC NO. 39829

Hueper, W. C.

ENVIRONMENTAL CANCER HAZARDS CAUSED BY INDUSTRIAL AIR POLLUTION. *Interdepartmental Committee on Air Pollution, Washington, D. C., Air Pollut., Proc. U. S. Tech. Conf., Washington, D. C., 1950, p. 479-484. (May 3-5, Louis C. McCabe, ed.)*

An appreciable number of recognized or suspected occupational cancers are probably caused by inhalation of certain cancerigenic chemicals in dust, fumes, vapors, mists, or gases. Combustion and fractionation products of coal such as soot containing cancerigenic tar, tar fumes, and pitch and tar dust are polluting the environmental air from various sources and at many places. Whenever production and waste disposal methods in aromatic amine operations are inadequate, dust, fumes, and vapors of beta and alpha-naphthylamine and benzidine may enter the air of the factory fume zone. The large-scale use of arsenical dusts as pesticides also creates potential cancer hazards. Cancerigenic agents polluting the air may enter the human body by inhalation, skin contact, or ingestion. The future control of these potential hazards depends upon reliable qualitative and quantitative demonstration of cancerigenic agents in the air around establishments producing or handling recognized or suspected cancerigenic agents, upon thorough epidemiologic studies of cancer incidence in the population living in the fume or waste disposal zone of such plants, and upon subsequent institution of effective measures preventing further release of cancerigenic agents into the ambient air. Environmental cancerigenic agents are tabulated with corresponding type of contact and site of cancer.

21678 APTIC NO. 40078

Hueper, W. C. and William W. Payne

CARCINOGENIC STUDIES ON PETROLEUM ASPHALT, COOLING OIL, AND COAL TAR. *A.M.A. Arch. Pathol., vol. 70:372-384, Sept. 1960. 47 refs.*

Four road asphalts applied to the skin of and injected intramuscularly into mice and rats elicited cancers at the sites of application in some of these animals, attesting to the presence of carcinogenic constituents in these materials. Fumes from heated coal tar and petroleum roofing asphalt did not produce cancer of the lungs in rats and guinea pigs inhaling such fumes for a period of up to two years, although the administration of condensates of the coal tar fumes to the skin and muscle tissue of mice demonstrated the high carcinogenic potency of this matter. A roofing asphalt, on the other hand, proved to be noncarcinogenic to the skin of mice and rabbits. Paraffinic cooling oil fog inhaled by rats and guinea pigs elicited mainly multifocal adenomatosis in the lungs of these animals. Only one small squamous cell carcinoma of the lung was found in a rat. A few benign and malignant tumors appeared in the skin and muscle tissue of mice following the administration of the cooling oil to these tissues, indicating a weak carcinogenic property of this paraffin oil to the tissues of mice. (Author conclusions modified)

21679 APTIC NO. 40144

Ichinosawa, Teruo and Hajime Yamabayashi

AIR POLLUTION AND RESPIRATORY DISEASES - FROM THE STANDPOINT OF PULMONARY FUNCTION. *(Taikiosen to kokyuki shikkan-Hai-kino no tachiba kara-). Text in Japanese. Hai to Shin (Lung Heart), 19(1):9-19, March 1972. 44 refs.*

Epidemiological studies of air pollution and effect of irritants on pulmonary function are discussed. Several investigations on the effect of air pollution revealed that air pollution affects the pulmonary function. Quantitative and qualitative differences in the level of pollution appeared as the difference in the frequency of obstructive respiratory diseases. The effects of sulfur dioxide, nitrogen dioxide, and ozone on pulmonary resistance and synergism were described based on actual data and experimental results. Particulates (dusts and sulfates) were also mentioned. Synergism was studied with the following mixtures: SO2/sodium chloride; SO2/sulfates; SO2/dust; NO2/carbon dust; and ozone/organic peroxides. Subjects included guinea pigs, rats, mice, humans, rabbits, and cats. Pollutant sources are mentioned including automobile exhaust

21680 APTIC NO. 40139

Imai, Masayuki, Oshima Hidehiko, Tokiko Kawagishi, Katsumi Yoshida, and Masayoshi Kitabatake

EPIDEMIOLOGICAL STUDIES ON PATIENTS IN RELATION TO AIR POLLUTION IN YOKKAICHI. *(Yokkaichi ni okeru kogai nintei kanja no jokyo). Text in Japanese. Nippon Eiseigaku Zasshi (Japan. J. Hyg.), 26(4):386-393, Oct. 1971. 23 refs.*

A relief system for patients with bronchial asthma, asthmatic bronchitis, chronic bronchitis, and pulmonary emphysema was established in 1965 by Yokkaichi City. A similar system was substituted for the above system in 1969 by the Government. Changes in the number of patients were examined. Though 996 patients have been recognized since 1965, the present number of patients, excluding those who died or improved from the diseases, is 710. As compared with the statistical data in 1969, in 1970 when the relief system of Yokkaichi City was substituted by the governmental relief system, the number of the patients increased. Of these 307 patients having are bronchial asthma, 243 have asthmatic bronchitis, 125 have chronic bronchitis, and 8 have pulmonary emphysema. More patients are males than females; many are school children, aged people, and infants. Recently, the incidence in youth, less than 20 years old has increased. The tendency of death has not been clearly found. The average age of death is 62.7 years old. In primary school children, 156 patients are recognized. Most of the patients with asthmatic bronchitis and chronic bronchitis in lower grade had improved or were cured. However, the patients with bronchial asthma remain in the same condition. Correlation was observed between the level of air pollution in the community and the number of patients. Since 1966 when construction of higher stacks started in Isozu, a severely polluted area in Yokkaichi, the number of patients has gradually decreased but in the neighboring districts the number of new patients has increased.

21681 APTIC NO. 40445

Imai, M., H. Oshima, T. Fujino, and K. Yoshida

THE PRESENT STATE OF PATIENT OCCURRED BY AIR POLLUTION, WHO WERE RECOGNIZED BY LAW, IN YOKKAICHI. *(Yokkaichi chiiki ni okeru kogai nintei kanja no genkyo). Text in Japanese. Taiki Osen Kenkyu (J. Japan Soc. Air Pollution), 6(1):153, 1971. (Presented at the National Council Meeting of Air Pollution Studies, 12th, Nagoya, Japan, Oct. 27-29, 1971.)*

The patients whose illnesses were caused by air pollution and recognized by law increased from 208 in 1965 to 713 in 1971 in the Yokkaichi district. A correlation existed between the concentration of sulfur dioxide in the air and the rate of patients. In the Isozu area, which was the most highly polluted area, the patients increased only by one from 1970 to 1971. This was due to the high stack policy. The symptoms of the patients showed a peak for bronchial asthma in 1962 and for chronic bronchitis and asthmatic bronchitis in 1965 for the above area, and the declinations responded to the decreases of pollution. Bronchial asthma was wide-spread in all ages, while asthmatic bronchitis occurred mostly in infants.

21682 APTIC NO. 40437

Isoard, P.

BIOMETEOROLOGY, ATMOSPHERIC POLLUTION, AND EPIDEMIOLOGY. *(Biometeorologie, pollution atmospherique et epidemiologie). Text in French. Rev. Corps sante, 12(6):629-654, 1971. 35 refs.*

Biometeorological and epidemiological aspects of air pollution are reviewed with special regard to atmospheric microorganisms. A general description of meteorological and atmospheric phenomena (diffusion, sedimentation and precipitation) and physical, chemical, biological, and nosological classifications of air pollutants are discussed. Air pollutants may be infectious, allergenic, toxic, irritant, or hyperplastic. Particulate pollutants are spread by diffusion or sedimentation. The rate of sedimentation is practically constant for spherical particles of 1-50 micron under normal temperature and pressure conditions. The sedimentation is determined by gravity, washout, electrostatic charge, and coagulation. Inorganic particles may absorb organic particles or microorganisms during sedimentation. Particle studies in the 1-10 micron range are reviewed.

Both the sedimentation and the effects of microorganisms may be modified by inorganic particles. The annual variation of the mycomycetes showed minimum in December and a maximum in October, and the topographic variations were considerable. A relationship was found between humidity, wind, and fungal flora. Some 85-100% of the bacterial flora consisted of Pseudomonas alcaligenes, followed by corynebacteria, and cocci. Bacilli were always present in the air, though in relatively small proportion. Except for Ps. aeruginosa, no authentically pathogenic germs were detected. The absence of enterobacteria indicates that the potential effects of microorganisms are determined by the viability rather than by the diffusion phenomena. The micro-environment, necessary for microorganisms for survival, is determined by humidity and radiation. While microorganisms are inhibited by humidities above 70%, the effect of the radiation which is most bactericide at wavelengths of 253-256 micron, is dependent of humidity, temperature, species, and germ count, as groups are most sensitive than isolated microorganisms. Positive ionization in the presence of carbon dioxide considerably inhibited the ciliary activity in bronchitis, and decreased sensitivity of the lung during periods with low pollution levels was observed. A relationship between lung cancer and air pollution was found. Topographic, seasonal, and temperature-dependence of some allergenic diseases was determined.

21683 APTIC NO. 40688

Isoard, P., F. Marcotte, G. Lemercier, and R. Fontanges

STUDY ON THE EXPERIMENTAL ACTION OF ATMOSPHERIC POLLUTANTS ON THE LUNGS OF BALB/C MICE. *(Etude de l action experimentale de polluants atmospheriques sur le poumon de la souris Balb/c). Text in French. Pollut. Atmos. (Paris), 14-(53):43-55, Jan.-March 1972. 68 refs.*

A study on the biological effects of fine particulate pollutants on new-born mice is described. The air samples, taken at a rate of 0.4 m/sec in an industrial area, were subjected to freeze-drying. The mineral content of the samples was 99% (silicon, magnesium, aluminum, calcium, iron, lead, copper, manganese, and zinc) and 17 polycyclic aromatic hydrocarbons (pyrene, chrysene, benzo(a)anthracene, benzo(a)pyrene, dibenz(a,h)anthracene and fluoroanthene, for example) were determined in the rest. The preparations were administered intranasally (2.5 mg/0.1 ml), subcutaneously (1, 1.5, 2, and 3 mg/0.1 ml), and in the form of aerosol (1.5 mg). The animals were killed after 9 months for the investigation. Injections of high doses, causing ecchymotic spots, killed the animals usually within 24 hours. The LD50 was determined to be 1.596 mg. The pathologic investigation of the lungs of the 11 groups revealed histiocytovascular hypertrophic reticular pneumonia (23.50-80%), atrophic reticular pneumonia (5.90-13.80%), lymphoid stimulation (3.80-38.20%), and adenomatosis (4-76.50%), while the percentage of the normal mice within the different groups ranged from 12 to 76.50%. The damages were due to irritations or acute of chronic toxic effects, the latter mainly within the grain size range of 1-5 micron. No statistically significant tumor proliferation was found.

21684 APTIC NO. 40014

Jefferies, D. J. and M. C. French

LEAD CONCENTRATIONS IN SMALL MAMMALS TRAPPED ON ROADSIDE VERGES AND FIELD SITES. *Environ. Pollut., 3(2):147-156, April 1972. 11 refs.*

One hundred and one small mammals of three species of mice from sites in Huntingdonshire were analyzed to determine the lead concentration in the liver and whole body. The vegetation at the trap site was also analyzed. The range of sites covered roadside verges and fields. The mean lead concentration in the bodies of the mammals trapped increased from 4.19 dry weight ppm on woodland and arable sites, to 5.98 d/w ppm on verges of minor roads and 7.00 d/w ppm on the verges of a major highway 1.32, 1.92, and 2.26 wet weight ppm respectively). This differential of 1 7 times was much lower than that shown by the vegetation on the three types of sites (33.4, 42.5, and 306.7 d/w ppm respectively; 9.2 times differential). Microtus agrestis (field mice) contained significantly higher total body residues of lead on roadside verge sites (3.14 w/w ppm) than either Clethrionomys glareolus (bank voles) (1.89 w/w ppm) or Apodemus sylvaticus (field voles) (1.62 w/w ppm). This difference could be due to differing food and behavior. (Author abstract modified)

21685 APTIC NO. 39863

Jansen, Wallace N., Giuliana D. Moreno, and Marcel C. Bessis

AN ELECTRON MICROSCOPIC DESCRIPTION OF BASOPHILIC STIPPLING IN RED CELLS. *Blood, 25(6):933-943, June 1965. 23 refs.*

Blood or bone marrow cells from 20 rabbits, 20 guinea pigs, and 60 rats with lead intoxication were examined using a combination of supravital strains, light microscopy, and electron microscopy. There was marked variation in the time of appearance and in the number of stippled cells present. Stippling was always found in the bone marrow when it was present in peripheral blood, but was found only in the orthochromatophilic normoblasts which were relatively few in the animals with severe lead poisoning. Since the formation of stippling in cells depends on the dessication of the cells, they were not seen in plasma-suspended cells or in cells prepared in routine fastion for electron microscopy. The basic stippled material produced in blood cells by the action of supravital dye consisted exclusively of ribosomes. The spontaneous occurrence of the basophile stippling may be interpreted as evidence of ribosomal abnormality. However, the multiplicity of cellular injuries induced by lead suggests that ribosomal aggregation results from alteration of nonribosomal organelles or other cellular consituents.

21686 APTIC NO. 39828

Kehoe, Robert A.

EFFECTS OF PROLONGED EXPOSURE TO AIR POLLUTANTS. *Interdepartmental Committee on Air Pollution, Washington, D. C., Air Pollut., Proc. U. S. Tech. Conf., Washington, D. C., 1950, p. 474-478. 1 ref. (May 3-5, Louis C. McCabe, ed.)*

Etiologic and clinical aspects of air pollution are considered and air pollution of natural and artificial origin as well as topographic and metecrologic factors are discussed. Direct and reliable evidence of the occurrence of injurious effects of a chronic or insidious nature, as the consequence of the pollution of the general atmosphere of towns and cities up to the present time, is lacking. The prevailing concentrations of the more common contaminants of urban and industrial atmospheres are well below the upper limits regarded as safe for men whose work involves daily exposure to these materials. Unfavorable meteorologic conditions may retard the dissipation of these pollutants, thereby increasing their individual or composite concentrations to such an extent as to give rise to discomfort and even injury. Fragmentary information from a variety of sources points to the probability that chronic diseases of various types will occur with low but increasing frequency and perhaps increasing severity in our general population as the direct result of the pollution of the atmosphere of our cities with increasing numbers and quantities of new substances.

21687 APTIC NO. 39867

Kopito, Louis, Ann M. Briley, and Harry Shwachman

CHRONIC PLUMBISM IN CHILDREN. *J. Am. Med. Assoc., 209(2):243-248, July 14, 1969. 14 refs.*

The cases of a family of four children and their neighboring cousin in whom the diagnosis on mild lead intoxication was initally suspected because these children had grossly elevated lead content in scalp hair are described. Ages ranged from 7 yrs, 4 mo. to 2 yrs, 1 mo. Lead concentrations in urine, blood, and hair were determined by atomic absorption spectroscopy. After determination of the lead concentration in a timed urine specimen, all the patients were given edetate calcium disodium in a single dose of 50 or 75 mg/kg body weight. All patients tolerated chelation therapy well. Elevated concentrations of lead in the blood were observed in four of the patients; the fifth had an elevated level of lead in the urine indicating active excretion of the metal. The determination of lead in scalp hair is a valuable diagnostic aid in chronic or mild lead intoxication particularly when the clinical or laboratory evidence is of questionable diagnostic quality. This continuously growing tissue accumulates and stores lead for long periods and may be used for estimating the time and duration of the exposure. Hair is easy to obtain, store, transport, and analyze and may provide a practical means for finding young children who may have been exposed to lead.

21688 APTIC NO. 40655

Kornienko, A. P.

HYGIENIC ASSESSMENT OF A MIXTURE OF SULFURIC ACID AEROSOL, SULFUROUS ANHYDRIDE, NITROGEN OXIDES AND AMMONIUM AS ATMOSPHERIC POLLUTANTS. *(Gigiyenicheskaya otsenka smesy aerozolya sernoy kisloty, sernistogo angidrida, okislov azota i ammiaka kak zagryazniteley atmosfernogo vozdukha). Text in Russian. Gigiena i Sanit., 37(4):8-10, 1972. 3 refs.*

Direct and resorptive effects of various combinations of sulfuric acid aerosol, sulfur dioxide, nitrogen oxides, and ammonia were studied on individuals who appeared to be most sensitive to the odor of each of these pollutants. The odor threshold was found for a mixture of 0.02 mg of nitrogen oxides, 0.17 mg of SO2, 0.11 mg of H2SO4 aerosol, and 0.3 mg of ammonia per cu m of air. Electroencephalograph tests revealed another threshold concentration causing changes in the alpha-rhythm of the brain current (0.008 mg of NOx, 0.08 mg of SO2, 0.08 mg of H2SO4 aerosol, and 0.2 mg of NH3 per cu m). The resorptive effects were studied in a 90-day test on white rats (respective SO2, H2SO4 aerosol, and NOx concentrations in mg/cu m: 0.016, 0.033, 0.028 first group; 0.07, 0.14, 0.10 second group; and 0.33, 0.66 and 0.56 - third group). While both the weight and the behavior of the animals were normal, the reflex time increased in the second and third groups. Reduced cholinesterase activity, disturbed liver function, and increased blood methemoglobin and liver vitamin C contents were observed in the second and third groups. Statistically significant increases in the urinary 17-ketosteroid eliminations in the second group, and a trend toward decreased eliminations in the third group were observed. Histochemical investigations revealed no alteration in the first group. Interstitial alteration and catarrhal bronchitis in the lung, distrophic kidneys, and hypertrophic pancreas were detected in the second group. Intensification of the above alterations, partial necrosis of kidney canaliculi, as well as development of seminal tubuli with altered spermatogenic epithelia were found in the third group. The experiments revealed the summation of the effects of the above pollutants.

21689 APTIC NO. 40528

Kubo, Masaj

PATHOLOGICAL AND HISTOLOGICAL STUDIES TRACHEAE OF RATS RAISED IN GERM-FREE AND NATURAL ENVIRONMENTS, AND THOSE EXPOSED TO SULFUR DIOXIDE GAS. *(Mukin shizen shiiku ratto narabini aryusan gasu bakuro ratto kikan no byori soshikigakuteki kenkyu). Text in Japanese. Nihon Jibi Inkoka Gakkai Kaiho (Jap. J. Nephrol.), 74(1):39-60, Oct. 1971. 68 refs.*

In order to study the effects of sulfur dioxide on the respiratory system, 18 Wistar-type naturally raised rats were exposed to 10 ppm SO2 daily for 8 hours from 1 to 51 days, and compared with 34 Fisher-type germ-free rats, and 26 naturally raised rats. Mucous membrane epithelium of tracheae, basilar membrane, elastic fiber, and tracheae of the three groups were histologically studied. Since the morphological changes of goblet cells of epithelial mucous membrane have a close relationship with the increase of phlegm discharge of chronic bronchitis, the mucous pus production cells and the swelling of trachea, and the ratio of trachea and the trachial walls were microscopically studied and measured. Congestion and hemorrhage of bronchi and lungs were recognized in the exposed group. Edema and ulceric formation in lungs were also recognized in some of the exposed rats. Histologically, high degree of inflammation, clear cases of fibrin exposure, increase of epithelial mucous production were recognized. A lesser degree of mucous pus formation was recognized in the control group of naturally raised rats, but the germ-free group showed no sign of mucous pus production. Also, the size of trachea and the raio of trachea and trachea wall were greater in the exposed group and the naturally raised rats than among the germ-free rats. The cartilage system of germ-free and natural rats were compared.

21690 APTIC NO. 40435

Kunitake, Eizaburo, Yasushi Kodama, and Noburu Ishinishi

THE EFFECTS OF LEAD GENERATED FROM EXHAUST GASES. I. SPECIAL HEALTH EXAMINATION. *(Jidosha haikichu en no jinshin eikyo I. tokusho kenko shindan). Text in Japanese. Taiki Osen Kenkyu (J. Japan Soc. Air Pollution), 6(1):165, 1971. (Presented at the National Council Meeting of Air Pollution Studies, 12th, Nagoya, Japan. Oct. 27-29, 1971.)*

Fifty residents from a high traffic area of Fukuoka City and the same number of residents from a countryside residential area were studied for the effects of automotive exhaust gases on human health. Self-conscious symptoms were investigated based on questionnaires issued by the Welfare ministry. Special health examinations of lead poisoning were also carried out. The rate of resident with self-conscious symptoms, including headache, cough, nose, and eye symptoms was higher in the high traffic area, especially for female residents, who had a double rate. The investigation showed no differences for people in hazardous occupations and for heavy smokers from the two areas. Special health examinations of lead poisoning revealed no difference between the two groups of residents.

21691 APTIC NO. 39797

Kwon, Sook Pyo

A STUDY ON THE ISOZYMIC ALTERATIONS OF LACTIC DEHYDROGENASE IN THE TISSUES OF RATS FOLLOWING SULFUR DIOXIDE EXPOSURE. *Yonsei Med. J. (Seoul), 10(1):37-47, 1969. 30 refs.*

Lactic dehydrogenase (LDH) isozyme patterns were studied in rats after exposure to 250 ppm sulfur dioxide. The isozymes of brain, lung, heart, liver, kidney, and muscle tissues were separated on cellulose-acetate strips, visualized as the isozyme bands by the formazan reaction, and analyzed by densitometry. In addition, room air and room air plus SO2 were aerated through in vitro tissue homogenates accompanied by pure oxygen aeration in order to observe the in vitro effect of the gas on LDH activity in the various tissues. The H (heart muscle) type of LDH activity was dominant in normal heart tissue and M (skeletal muscle) type in normal lung, liver, and muscle tissues. The LDH-1 and -5 isozymes were predominant in kidney tissue and LDH-1 and -4 in brain. When rats inhaled 250 ppm SO2, the M-type tended to predominate in the anaerobic tissues such as liver and muscle, and the H-type in the aerobic tissues such as the heart and lung. The degree of oxygen tension seemed to be correlated with the low level of LDH activity in the anaerobic tissues and with the increased activity in the aerobic tissues. Low oxygen tension seems to favor synthesis of M-type LDH in rat tissue while high oxygen tension favors H-type LDH. (Author abstract modified)

21692 APTIC NO. 40068

Lachnit, V.

CONTRIBUTION TO CHRONIC DAMAGES FROM ENVIRONMENTAL POLLUTANTS. *(Zur Problematik chronischer Schaedigungen durch Umweltverunreinigungen). Text in German. Wien. Med. Wochenschr., 122(4):43-49, Jan. 1972. 44 refs.*

Pollutants, particularly trace elements which are present in the air in industrial plants and their environment and which may cause damage to health are reviewed. Few trace elements are concentrated enough to cause damage. Aluminum powder and aluminum oxide in high concentrations may cause diffuse interstitial fibrosis, while vanadium causes bronchitis. Beryllium, present in low concentrations, leads to beryllium pneumonia and berylliosis in high amounts. Cobalt affects the thyroid gland, and iron causes hemosiderosis. The mucous membranes are irritated by manganese and chromium, and the latter may have carcinogenic effect. Intensified studies on the effects of nickel and cadmium are required. The nickel intake from food and water is more important than from the air. Cadmium accumulates in the kidney and the liver, and may cause hypertonia. Lead has become one of the most important pollutants among the trace elements. The intake from air accounts for 30-50% of the total, while the daily intake in food lies at 0.3 mg. Some 10% of the total lead incorporated is resorbed. Lead concentrations of 80-115 ppm were found in plants near highways. Animals chronically exposed to lead showed reduced life expectancy. Decrease in delta-aminolevulinic acid dehydratase and reduced adenosintriphosphatase activity, constitute precursors of lead poisoning. The increased concentration of asbestos fibers, especially near building sites, represents a serious problem. Asbestos particles, showing the characteristic iron reaction, were revealed in the lung in 30-70% of the inhabitants in big cities. While the increased frequency of lung carcinoma and pleuromesothelioma may be associated with asbestos, a carcinogenic effect has not yet been ascertained.

21693 APTIC NO. 40654

Lahmann, E.

AIR POLLUTION AND ITS HYGIENIC MEANING. *(Die Verunreinigung der atmosphaerischen Luft und ihre hygienische Bedeutung). Text in German. Lebensversicherung Med., 24(2):28-32, March 1972. 17 refs.*

Health aspects of air pollution are outlined. Traffic, domestic heating, and industry (power plants, metallurgy, coal and petroleum processing, chemical industry) are the main sources of air pollution. Domestic heating, which chiefly emits sulfur dioxide and fly ash, creates considerable health hazards, particularly due to the low altitude of the emissions. The problems involved in industry-generated air pollution are primarily due to the concentration of industrial plants in certain areas. Investigations of the mainly chronic effects of air pollution on man are possible in animal and human experiments as well as by means of statistical and epidemiological studies. The latter approach, referring primarily to acute damages under exceptional meteorological conditions, has seldom led to concrete results. Effects of sulfur dioxide, carbon monoxide, and nitrogen dioxide in different concentrations on man are reviewed. Sulfur dioxide measurements in various cities in West Germany revealed a direct relationship between the SO2 concentrations and the size of the city. Specific meteorological conditions may favor the spread of local pollution, caused by domestic heating and traffic in cities, over large areas. The observance of concentration limit values should be completed with the general application of technically possible solutions in the field of pollution control.

21694 APTIC NO. 40295

Lehnert, G., H. Mastall, D. Szadkowski, and K. H. Schaller

VOCATIONAL LEAD CONTAMINATION BY AUTO EXHAUST GASES ON CITY STREETS. *(Berufliche Bleibelastung durch Autoabgase in Grossstadtsstrassen). Deut. Med. Wochschr., vol. 95:1097-1099, May 15, 1970. 21 refs. Translated from German. Leo Kanner Assoc., Redwood City, Calif., 11p., Dec. 1971.*

A study on 158 employees of the vehicle pool of the city of Frankfurt/Main (79 garbage men and 79 street cleaners) was performed to investigate the possibility of lead poisoning due to air pollution originating from the use of leaded gasoline. Determination of the blood lead level and the delta-aminoevulinic acid deposit in the urine resulted in the following statistically warranted findings: Both occupational groups exhibited a larger lead accumulation than the general population. The mean blood lead level was higher for street cleaners than for garbage men. The degree of poisoning, based on the deposit of delta-aminolevulinic acid in the urine, must be regarded as no longer acceptable from the medical fitness-for-work standpoint for 16% of those examined. Tabular data consisting of mean values and deviations from standard of the delta-aminolevulinic acid (ALA) deposit in urine and variance analytical comparisons between the test group and a control group for blood lead level and ALA deposit in the urine are presented along with point correlation diagrams for the relationship between the ALA deposit in the urine and the blood lead level and for the relationship between the blood lead level and the length of employment.

21695 APTIC NO. 40809

Lichtman, Herbert C. and Felix Feldman

IN VITRO PYRROLE AND PORPHYRIN SYNTHESIS IN LEAD POISONING AND IRON DEFICIENCY. *J. Clin. Invest., 42(6):830-839, 1963. 39 refs.*

Alterations of porphobilinogen and porphyrin synthesis from delta-aminolevulinic acid in lead poisoning and iron-deficiency anemia were investigated. In the lead poisoned erythrocyte, the activity of delta-aminolevulinic acid dehydrase, the enzyme necessary for conversion of delta-aminolevulinic acid to porphobilinogen, was decreased. In vitro porphyrin production from delta-aminolevulinic acid was markedly diminished in lead poisoning. In the lead poisoned erythrocyte, the delta-aminolevulinic acid dehydrase deficit can be reversed by preactivating the incubation mixtures with glutathione; however, glutathione preincubation does not augment in vitro porphyrin production from delta-aminolevulinic acid, indicating a defect in the biosynthetic pathway for heme in the sequence beyond porphobilinogen. In erythrocytes in iron-deficiency anemia, delta-aminolevulinic acid dehydrase activity was normal; in vitro porphyrin synthesis was diminished. (Author summary modified)

21696 APTIC NO. 39804

Martin, A. E.

MORTALITY AND MORBIDITY STATISTICS AND AIR POLLUTION. *Proc. Roy. Soc. Med., vol. 57:969-975, 1964. 18 refs.*

The immediate results of exposure to individual peaks of air pollution are discussed. A severe polluted fog in London on Dec. 5-8, 1952 caused an estimated 4000 additional deaths in Greater London. The rise in mortality is immediate, a considerable number of deaths occurring within the first 24 hr. Excess deaths occurred almost entirely from respiratory and cardiovascular causes. Investigation of less severe incidents shows that it is difficult to fix any threshold value below which levels of air pollution might be regarded as safe. The results of another study based on degree of bronchitis show that the degree of illness was more closely related to daily values of atmospheric pollution than to any other factor in winter months, but the association disappeared when the pollution fell to low levels in the spring. Two other factors which are thought to influence the effect of air pollution on mortality are low temperatures and the amount of illness current in the population at the time of the air pollution incident. An air pollution incident that occurred in the middle of an influenza epidemic in February 1959 was accompanied by an exceptionally high mortality confined to the day of maximum pollu-

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21697 APTIC NO. 40185

Maruya, Hiroshi

A CHANGE OF ASTHMA PATIENTS AT KYODO HOSPITAL IN MIZUSHIMA. *(Mizushima chiku k byoin ni okeru zensoku kanja no suii). Text in Japanese. Taiki Osen Kenkyu (J. Japan Soc. Air Pollution), 6(1):147, 1971. (Presented at the National Council Meeting of Air Pollution Studies, 12th, Nagoya, Japan. Oct-27-29, 1971.)*

The number of patients with asthma in the Mizushima area treated at Kyodo hospital was related to the conditions of air pollution before and after the operation of petroleum industries in this area. The concentration of sulfur trioxide was measured by the lead oxide method, while that of sulfur dioxide was measured by the conductivity method. Results showed that the number of patients with asthma in 1969 and 1970 increased three times compared to that before the operation of the petroleum industries. The amount of heavy oil consumption and the SO3 concentration also increased by a factor of about three when compared to 6 years ago. Air pollution had a strong effect on the health of infants.

21698 APTIC NO. 39979

Matevosyan, R. S. and G. A. Parsandanyan

THE METHOD OF JOINT POISONING OF LABORATORY ANIMALS WITH DUST AND GAS. *(Metodika kombinirovannoy zatravki laboratornykh zhivotnykh pyl yu i gazom). Text in Russian. Gigiena i Sanit., 37(2):80, 1972. 4 refs.*

An apparatus, designed for the joint poisoning of laboratory animals with dust and gases is described. The dosaging apparatus is suitable for adjusting, stabilizing, and varying dust and gas concentrations. The apparatus is composed of a gas balloon, absorbers, compressor, pressure reducer, and pipe connection. The gas is led from the balloon across a reducer and absorbers containing water to a Latushkina chamber and to a pipe connection. The gas concentration is regulated by means of the pressure reducers and clips, while the dust concentration is adjusted in the usual manner. The apparatus has been successfully applied for 6 months for dust from copper smelting and sulfur dioxide.

21699 APTIC NO. 40105

McDonald, Stuart, Jr. and D. L. Woodhouse

ON THE NATURE OF MOUSE LUNG ADENOMATA, WITH SPECIAL REFERENCE TO THE EFFECTS OF ATMOSPHERIC DUST ON THE INCIDENCE OF THESE TUMOURS. *J. Pathol. Bacteriol. (London), 54(1):1-12, 1942. 23 refs.*

Histologic investigation of a series of 71 primary tumors of mouse lung was undertaken. Of these, 69 had the structure of the Tyzzer adenoma. It is considered that this lesion originates and spreads by metaplasia and proliferation of the alveolar epithelium, bronchiolar epithelium also participating in the proliferative process. Destructive invasion of the lung is not a feature of this growth. The remaining two tumors have typical carcinomatous appearances. There is a close morphologic similarity between the Tyzzer adenoma and epizootic pulmonary adenomatosis in Icelandic sheep. A series of albino mice was exposed to the inhalation of atmospheric dust in which benzpyrene was demonstrated by spectroscopic analysis. A further series was painted with dust extract. The Tyzzer adenoma incidence was 22.8% in the dust inhalation group and 25% in the dust extract painting group as compared with a 14.3 and 15.8% incidence in the controls. (Author summary modified)

21700 APTIC NO. 39930

Men shikova, T. A.

HYGIENIC EVALUATION OF DIBUTYL PHTHALATE IN RELATION TO THE USE OF POLYMER FINISHES IN SHIPBOARD LIVING QUARTERS. *(Gigienicheskaya otsenka dibutilftalata v svyazi s ispol zovaniem polimernykh materialov dlya otdelki zhilykh pomeschenii na sudakh). Hyg. Sanit (English translation from Russian of: Gigiena i Sanit.), 36(3): 349-353, March 1971. 10 refs.*

NTIS: TT 71-50122

Polymer finishes for living quarters on ships are often plasticized with highly volatile dibutyl phthalate (DBP). Therefore, field and laboratory studies were conducted to determine shipboard DBP levels, the amount of DBP liberated from plasticized polymers, and the biological effects of the plasticizer. Treated pavinols released DBP in concentrations up to 4.73 mg/cu m. Concentrations in the living quarters of a 3-year-old spip reached 1.22 mg/cu m. suggesting the possibility of prolonged liberation in ambient air. The olfactory threshold for human subjects was 0.26-1.47 mg/cu m DBP; the threshold for reflex alteration in ocular sensitivity to light was 0.16 mg/cu m. Concentrations of 0.15 and 0.12 mg/cu m in combination with continuous light produced an electrocortical conditioned reflex. Concentrations of 0.25 and 1 mg/cu m had an inhibitory effect on white blood corpuscles in rats. Based on these observations, 0.1 mg/cu m DBP is recommended as the one time mean diurnal permissible concentration. Concentrations liberated from shipboard materials should not exceed this limit.

21701 APTIC NO. 39964

Meurman, Lauri

ASBESTOS BODIES AND PLEURAL PLAQUES IN A FINNISH SERIES OF AUTOPSY CASES. *Acta Pathol. Microbiol. Scand. Suppl., vol. 181:1- 107, 1966. 137 refs.*

The occurrence of asbestos bodies in the lungs and of fibrotic thickening in the form of plaques on the parietal pluera was investigated in a routine autopsy series of 438 subjects aged 15 yr and older, collected from the central hospitals of three different regions in Finland. One of these regions contains the site of an anthophyllite asbestos mine. In 264 cases asbestos bodies were counted in histological lung sections stained for iron. Asbestos bodies were more frequent among the urban than among the rural population, and were more numerous in men, although the frequency was not higher in men than in women. Of the total cases, 39.3% showed either unilateral or bilateral thickening of the parietal pleura in the form of plaques. Plaques were observed in 52.2% of the urban population and in 31.8% of the rural polution. Plaques occurred in all age groups, but more frequently among men. The plaques are described anatomically and histologically. Asbestos bodies in the lungs and pleural plaques occurred more in conjunction than separately, the difference being very highly significant. Results indicate that pleural plaque formation, particularly when bilaterel, and the occurrence of asbestos bodies in the lungs have some etiologic factor in common. The dust which induces the formation of asbestos bodies does not, however, seem to be the sole cause of plaque formation. (Author summary modified)

21702 APTIC NO. 40433

Miyagawa, A., T. Mizuhara, H. Hashimoto, H. Muranaka, H. Yoshida, and T. Ito

THE EFFECTS OF AUTOMOBILE EXHAUST ON NATIONAL ROAD NO. 26 IN CONTROL CITY. (PART 3). *(Osaka kokudo nijurokugo sen endo ni okeru jidosha haishutsu gasu jintai eikyo chosa sono san tsuiseki seiseki). Text in Japanese. Taiki Osen Kenkyu (J. Japan Soc. Air Pollution), 6(1):163, 1971. (Presented at the National Council Meeting of Air Pollution Studies, 12th, Nagoya, Japan, Oct. 27-29, 1971.)*

Nine hundred and eighty-seven residents in the area of a national road in Osaka were investigated for the effects of automobile exhaust gas on the health of human body. The concentrations of carbon monoxide, sulfur oxides, nitrogen oxides, ozone, particulates, and hydrocarbons were measured for the exposed and control area, and the condition of residents in the exposed area were compared to that of residents in the control area. The concentrations of the pollutants were much higher in the exposed area; some were as high as a few times that in the control area. The rate of the residents in exposed area who had symptoms such as cough, pain in throat, and headache was also much higher than that of residents in the control area. More noise pollution was experienced by residents in the exposed area. From 1969 to 1970, the average wholeblood density and the hemoglobin content of the exposed residents decreased remarkably.

21703 APTIC NO. 40064

Miyaji, Kazuma, Hideo Kashiwagi, Shizuo Kaneko, Tsuyoshi Kusa, Touru Takahashi, Taneharu Nakamura, Makoto Yanagida, Uichiro Shinya, and Yoishi Karimata

PROBLEMS OF CLASSIFICATION, ETIOLOGY AND TREATMENT OF YOKKAICHI ASTHMA. *(Yokkaichi zensoku no byokei, seiin, chiryo no mondaiten. Narabini zensokushi no kosatsu). Text in Japanese. Hai to Shin (Lung Heart), 19(1):30-42, March 1972. 9 refs.*

The patients of Yokkaichi asthma were divided into two groups. The patients of Group A have suffered from the disease earlier than 1960 when air pollution was noted, and in Group B the disease began in 1960 or later. Chronic bronchitis has been increasing with the increase of air pollution and reached 11% of the total respiratory diseases in 1963 although it was only 1.8% in 1959. Bronchial asthma was 3% of the total respiratory diseases in 1959, and gradually increased and reached 7% in 1962 and 10% in 1970. Of the 126 patients examined, chronic bronchitis was observed in 6.9% of the patients in A group and 23.7% in B group. Among the 97 patients of the B group, 66.0% had bronchial asthma, 23.7% had chronic bronchitis, and 10.3% had pulmonary emphysema. Asthmatic-type of pulmonary emphysema was observed in six patients out of ten. Though genetic factors and allergens have not been found in the patients with Yokkaichi asthma, allergic symptoms were observed. Histamines and serotonin levels were high in patients of asthma at midnight, even when asthma did not attack. Significant differences were found between the lung autopsies of patients in polluted areas and non-polluted areas. Inflammation of the bronchial ramus and bronchioli was found in lung autopsies of the patients in polluted area. As a medical treatment for the disease, bronchodilating agents are prevalent, but their extravgant use has caused death from asthma. Experimental results related to extravagant use of this kind of agent are mentioned.

21704 APTIC NO. 40436

Motomiya, K., R. Yoshida, G. Adachi, K. Ito, and M. Matsumura

AN EPIDEMIOLOGICAL SURVEY ON THE EFFECTS OF AIR POLLUTION IN FUJI CITY. *(Fuji shi ni okeru taiki osen no jintai ni oyobosu eikyo no eikigaku chosa). Text in Japanese. Taiki Osen Kenkyu (J. Japan Soc. Air Pollution), 6(1):152, 1971. (Presented at the National Council Meeting of Air Pollution Studies, 12th, Nagoya, Japan, Oct. 27-29, 1971.)*

The effects of air pollution on the health of 542 municipal clerks of Fuji City were investigated. Approximately 90% of the test clerks had been living in the city for more than 5 years. A short questionnaire on respiratory symptoms was used for the study. The percentage of the male clerks having chronic bronchitis was significantly higher than that of men reported for two other cities, one of which had high air pollution, whereas that of the female clerks was either lower or no different compared to that in the other two cities. Since the rate of heavy smokers (25 cigarettes a day) was much higher in the test clerks that that of men in the other cities, [illegible] was suggested as the cause of the high rate of symptoms.

21705 APTIC NO. 40437

Nagata, M., Y. Ito, and T. Tsuji

PREVALENCE OF RESPIRATORY SYMPTOMS OF CHILDREN IN A REGION AIR-POLLUTED BY NO2, NO, AND HCL GAS. *(NO, NO2, HCl gasu ni yoru osen chiku yochienji kokyuki shojo yusho jokyo). Text in Japanese. Taiki Osen Kenkyu (J. Japan Soc. Air Pollution), 6(1):151, 1971. (Presented at the National Council Meeting of Air Pollution Studies, 12th, Nagoya, Japan, Oct. 27-29, 1971.)*

The flue gas and smoke from the chemical plants in Shibukawa City have injured plants and metallic structures in the vicinity. The highest concentrations were 0.01 ppm for chlorine gas, 0.9 ppm for hydrogen chloride gas, 0.1 ppm for both nitric oxide and nitrogen dioxide, and 0.05 ppm for sulfur dioxide. The kindergartens and nursery schools of the city were divided into industry vicinity, medium polluted and nonpolluted groups, and the pollution effects on the school children were investigated. Percentages of boys with bronchitis, tonsilitis, and measles and that of girls with tonsilitis and measles were higher in the plant vicinity group, whereas those of girls with bronchitis showed no remarkable differences in the three groups.

21706 APTIC NO. 40168

Nakajima, Taichi and Shigeko Kusumoto

CHRONIC EFFECTS OF NO2 ON MOUSE. *(Nisanka chisso no mansei eikyo). Text in Japanese. Taiki Osen Kenkyu (J. Japan Soc. Air Pollution), 6(1):144, 1971. (Presented at the National Council Meeting of Air Pollution Studies, 12th Nagoya, Japan, Oct. 27-29, 1971.)*

The chronic effects of nitrogen dioxide on four-week-old mice were studied by exposing them to NO2 gas of a low concentration continuously for one month. The amount of reduced glutathione was measured, and the patho-histological effects were examined by the effects on the respiratory system including the bronchus and lung. At 1.0 to 1.5 ppm, remarkable inflammatory broncho-pneumonia and local pneumatosis pulmonum, incomplete regeneration of cilium epithelial cells, proliferation and light deformation of the clara cell of the broncho-mucous membrane, and swelling of the epithelial cells of the alveolus of the lung were found. Inhibition of increases of body weight was also witnessed. At 0.7 to 0.8 ppm, inflammatory bronchopneumonia, local pneumatosis pulmonum, and deformation and decollement of the broncho-mucous membrane were found. At 0.5 to 0.8 ppm light inflammatory bronchopneumonia, proliferation of clara cells of the terminal bronchus, swelling and retrenchment of cilium, and swelling of epithelial cells of alveolus of lung were found. At 0.2 to 0.5 ppm, the above symptoms were not significant. Synergetic effects occurred when exposed to a gas of 0.5 to 0.8 ppm NO2 and 50 ppm carbon monoxide. The average amount of reduced glutathione in the lungs of mice which were continuously exposed to 0.3 to 0.5 ppm NO2 for 6 months was 634 micrograms/g of wet lung, whereas that of the control group was 875.

21707 APTIC NO. 40531

Nakamoto, Akiyoshi and Hidenori Dodo

EPIDEMIOLOGICAL STUDY RELATED TO AIR POLLUTION IN YOSHIJIMA, HIROSHIMA CITY - PREVALENCES OF RESPIRATORY DISEASES IN CHILDREN. *(Hiroshima-shi Yoshijima ni okeru taikiosen no eikyo ni kansuru igakuteki chosa). Text in Japanese. Hiroshima Igaku (J. Hiroshima Med. Assoc.), 25(4):489-494, April 1972. 6 refs.*

A survey was carried out to determine the prevalence of respiratory diseases in children living in four areas with different conditions of air pollution caused by the city waste incinerator in Hiroshima City. The four areas are: area A which is 600 m from the source of pollution; area B which is slightly influenced by the source; and areas C and D which are hardly influenced by it. Members of a medical association in each area were selected as monitors and a survey was carried out of children under 15 years old from June to Nov. 1971. The survey took the form of the ratio of diseases related to chronic bronchitis, asthmatic bronchitis, and asthma and to air pollution. Area A had the highest ratio of the diseases in both males and females. The highest sulfur dioxide monthly rates were recorded in June, July, August, and November in area A. The highest falling dust amounts were also found during this period. The ratio of physical diseases of females and males in area A was significantly higher than other areas. The rate of male diseases is also significantly higher than B and C. The B, C, and D areas revealed no significant difference between sexes. When area A was compared with other polluted areas, the falling dust amount was exceedingly higher. Similar conditions were also observed among Hokohama asthma cases in Yokohama City. Thus, children are influenced by air pollution.

21708 APTIC NO. 40218

Nizhegorodov, V. M. and Ya. L. Markhotskii

EFFECT OF PROLONGED COMBINED EXPOSURE TO CARBON MONOXIDE, NITROGEN PEROXIDE, AND AMMONIA ON THE VITAMIN B6 REQUIREMENT OF ALBINO RATS. *(Vliyanie dlitel nogo sovmestnogo vozdeistviya okisi ugleroda, dvuokisi azota i ammiaka na potrebnost belykh krys v vitamine B6). Hyg. Sanit. (English translation from Russian of: Gigiena i Sanit.), 36(1):137-139, Jan. 1971. 5 refs.*

NTIS: TT 71-50122

Forty albino rats were studied for the effects of prolonged combined exposure to low concentrations of carbon monoxide, nitrogen dioxide, and ammonia on their vitamin B6 requirements. All animals were exposed to 21 mg/cu m CO, 2.1 mg/cu m NO2, and 16 mg/cu m ammonia in a 408-liter volume chamber 6hr/wk for 139-149 days. All groups were fed identically except that two groups were given 25 and 50 microgram pyridoxine, respectively, in their milk in addition to the daily B6 ration (22-37 microgram). The combined exposure to CO and NO2 gases and ammonia produced a pronounced depletion of vitamin B6 and marked disturbances of nutritional functions in the animals. Rats administered 50 microgram pyridoxine had a higher B6 content in their organs and tissues, but their B6 requirements more than doubled. The concentrations of the three gases that produced these effects were below present industrial maximum permissible concentrations. The use of vitamins in preventing pathophysiologic changes in humans suffering from chronic poisoning by these gases should be studied.

21709 APTIC NO. 40539

Nizze, H.

ASBESTOS AND ITS DANGERS FOR MAN. *(Asbest und seine Gefahren fuer den Menschen). Text in German. Deut. Gesundheitsw., 27(20):913-916, 1972. 112 refs.*

The world consumption of asbestos today exceeds 4 million tons. There are between 1000 and 3000 uses for asbestos. It is contained in brake-linings, concrete, and street pavements. The abrasions of thdse products and their contribution to general air pollution have not been studied yet. It is also contained in textiles, synthetics, insulating material, and cardboard paper which also may act as uncontrolled dust sources. Extreme views hold that there is not a single person in the civilized world today which is not exposed to asbestos dust. The relative frequency of asbestos bodies in the lungs of autopsy patients varies from 0 to 100%. This may be to experimental variables. The differentiation of true asbestos bodies (caused by asbestos fibers) and asbestos-like bodies is difficult. Asbestos-dust exposed persons can suffer from asbestosis, bronchial carcinomata and pleura mesotheliomata.

21710 APTIC NO. 40044

Nose, Yoshikatsu

AIR POLLUTION AND RESPIRATORY DISEASE. - FROM THE EPIDEMIOLOGICAL STANDPOINT. *(Taikiosen to kokyuki shikkan - Ekigaku-teki na tachiba kara). Text in Japanese. Hai to Shin (Lung Heart), 19(1):1-8, March 1972. 14 refs.*

The results of epidemiological studies on bronchial asthma, asthmatic bronchitis, and bronchitis in infants and aged people were reported. Frequency of respiratory diseases, asthmatic diseases, and bronchitis under different ages in Tobata District in Kita-Kyushu City of Fukuoka Prefecture and Tokuyama-Nanyo District of Yamaguchi Prefecture were compared. Distribution patterns in the three groups of diseases were almost same. Respiratory diseases and asthmatic diseases showed a peak in the group of one-year-old infants, but bronchitis showed a peak in three-year-old infants. Frequency of asthmatic bronchitis and asthma had a significant difference between both sexes. An epidemiological investigation about the frequency of asthma among hereditary factors strongly affected the occurrence of asthma. However once the disease occurred, air pollution had a significant relationship to its progress. Comparison between the morbidity of chronic bronchitis among aged people (over 40 yrs old) in eight cities showed that morbidity was higher in men than in women in all cities. Increases of the level of pollution were correlated with increases of morbidity of the disease. Mortality from chronic bronchitis decreased with the decrease of unsoluble substances contained in dust fall in four cities in Yamaguchi Prefecture.

21711 APTIC NO. 40170

Oka, Michio, Shigeo Yamaoka, Osamu Fukase, and Masanori Fukuda

EFFECT OF OZONE ON LUNG PROTEOLYTIC ENZYMES. *(Ozon bakuro ni yoru hai tanpakushitsu bunkai koso no dotai ni tsuite). Text in Japanese. Taiki Osen Kenkyu (J. Japan Soc. Air Pollution), 6(1):142, 1971. (Presented at the National Council Meeting of Air Pollution Studies, 12th, Nagoya, Japan, Oct. 27-29, 1971.)*

The effects of ozone on the lungs of six-week-old male rats were studied. The ozone was generated by ultraviolet radiation of air treated with activated carbon, and then introduced into the exposure room where rats were kept. Lung proteinase activities were determined by measuring the enzyme activities of the physiological saline solution extract of fresh lungs based on the urea deformation hemoglobin. Two kinds of proteinase were found in the extract. Six of the 10 rats exposed to 5-7 ppm of ozone for 3-4 hr died from severe lung hydropsy and hemorrhage. Both proteinase I and II activity decreased; I lost about half of its activity. Exposure to 2-3 ppm ozone for 4 hr caused lighter hydropsy and hemorrhage and almost no change of the proteinase activities. Rats exposed to 4-7 ppm ozone for 1 hr showed loss of body weight on the second day, but returned to normal compared to the control group. The lung weight, water content, and protein increased and showed maximums on the second day, but returned to normal after the fifth day. The protienase I activity increased to 1.5 times that of the control group on the fifth day, whereas the proteinase II activity did not change. From the fact that decreases of enzymic activities were not found when 7 ppm of ozone was introduced into the lung extract for 1 hr, it was believed that proteinase inhibitor existed in the injured lungs. The trypsin inhibitor activity increased for the ozone exposed group, and during the course of curing, its change was same as that of the lung weight.

21712 APTIC NO. 40169

Okazaki, K.

THE RELATIONSHIP BETWEEN THE HEALTH OF CHILDREN AND AIR POLLUTION IN KYOTO CITY. *(Kyoto shi ni okeru taiki osendo to shoji zensokuyo shojo to no kankei). Text in Japanese. Taiki Osen Kenkyu (J. Japan Soc. Air Pollution), 6(1):146, 1971. (Presented at the*

National Council Meeting of Air Pollution, 12th, Nagoya, Japan, Oct. 27-29, 1971.)

The effects of air pollution on health of school-children were investigated on more than 35,000 first and second grade students from 153 schools in Kyoto city. The concentrations of sulfur dioxide and nitrogen dioxide in air in the schools were measured by alkaline filter paper method. Six percent of the children have typical asthma, which was about 40% of that in the highly polluted area in Kita-Kyushu city and 80% of that in relatively low polluted area. The number with the above symptoms in the high polluted area in Kyoto city was about 1.4 times that in the low polluted area. The percentage of students with the above symptom in each school ranged from zero to 8.74, and the relationship between this and the degree of pollution was found. Other symptoms also were related to the degree of pollution.

21713 APTIC NO. 39796

Rall, David P.

DIFFICULTIES IN EXTRAPOLATING THE RESULTS OF TOXICITY STUDIES IN LABORATORY ANIMALS TO MAN. *Environ. Res., vol. 2:360-367, 1969. 13 refs.*

Difficulties in extrapolating the results of toxicity studies in laboratory animals to man are considered by covering three different but related areas. The first concerns the pharmacologic basis for prediction; the second, how good the prediction is; and the third, how good the prediction can and should be. In considering extrapolation of biologic data from one species to another, it is worthwhile to consider the definition of a species. It would be surprising, indeed, if some aspects of the characteristics of uniqueness of each species were not related to responses to chemical agents. Age considerations are mentioned. Absorption, distribution and storage, excretion, metabolism, and site and mechanism of action are all involved in the pharmacologic action of a chemical. Each of these five steps is analyzed in relation to the degree of consistency among various species. Quantitative predictability is concerned with the consistency of the therapeutic or toxic doses between species, and qualitative, with the nature of the pharmacologic response. Examples are given. Toxicity which has a relatively low incidence, irreversible toxicity, and instances in which there is a great delay between the administration of the causative agent and the manifestation of the toxic effect are discussed.

21714 APTIC NO. 39812

Reid, D. D., D. O. Anderson, B. G. Ferris, and C. M. Fletcher

AN ANGLO-AMERICAN COMPARISON OF THE PREVALENCE OF BRONCHITIS. *Brit. Med. J. (London), vol. 2:1487-1491, Dec. 12, 1964. 11 refs.*

The reported British excess in bronchitis morbidity was studied by comparing the results of field surveys carried out in various parts of Great Britain and in Berlin, New Hampshire. In both, similar respiratory symptom questionnaires and a simple lung function test with the Wright peak-flow meter were used. The prevalence of simple bronchitis--that is, chronic phelgm production--differs little between the American towns and the rural and urban areas of Britain. Its relation to cigarette smoking in particular is obvious in the results from both countries. On the other hand, complex bronchitis with repeated chest illnesses and breathlessness is more common among older men in Britain. After differences in age distribution and smoking habits were taken into account, this form of bronchitis appeared to be about equally common in the American town and in the rural areas of Britain. It is much more common, however, in the British towns and cities, especially among men. Lung function test results are consistent with this suggestion of a higher prevalence of a more severe form of bronchitis among older males living in British urban conditions. (Author summary modified)

21715 APTIC NO. 40310

Saknyn, A. V. and N. K. Shabynina

SOME STATISTICAL MATERIALS ON CARCINOGENIC HAZARDS IN THE PRODUCTION OF NICKEL ON AN ORE OXIDE BASE. *(Nekotoryye statisticheskiye materialy o kantserogennoi opasnosti v proizvodstve nikelya na baze okislennykh rud). Gigiena Truda Prof. Zabolevaniya, vol. 14:10-13, Nov. 1970. 6 refs. Translated from Russian. Leo Kanner Assoc., Redwood City, Calif., 7p., Dec. 1971.*

The increased mortality rates due to cancer and sarcoma among workers of a nickel combine were statistically investigated and compared with similar rates for the city population and environs. Lung cancer accounted for the highest mortality rate at a factor of 2.8 among males 40 years old and older working in the roasting-reduction and cobalt shops and exposed dusts containing nickel sulfides, nickel oxides, and cobalt and arsenic compounds. The average service period from workers employed in nickel shops who died of pulmonary carcinoma was 13 years. Femoral and pulmonary sarcomas were most often encountered among the men at the combine.

21716 APTIC NO. 40312

Sandstead, Harold H.

EFFECT OF CHRONIC LEAD INTOXICATION ON IN VIVO I131 UPTAKE BY THE RAT THYROID. *Proc. Soc. Exp. Biol. Med. vol. 124: 18-20, 1967. 9 refs.*

In vivo depression of iodine (131) uptake by rat thyroid and the conversion ratio has been produced by chronic lead intoxication. Lead apparently combines with sulfhydryl groups, thus inhibiting the enzymes. Lead may also displace iodine from a protein sulfenyl iodide carrier. This would effectively inhibit the uptake of iodine by the gland and inhibit the iodination of thyroylobin. Lead poisoning in recent years has become a problem affecting persons who consume moonshine whiskey. Impaired I(131) uptakes responsive to thyroid-stimulating hormones occurs in patients with plumbism and is caused by lead.

21717 APTIC NO. 39927

Santamaria, Leonida and Giacomo G. Giordano

EFFECTS OF LONG-WAVE ULTRAVIOLET RADIATION ON POLYCYCLIC HYDROCARBON CARCINOGENESIS. *In: The Biologic Effects of Ultraviolet Radiation. F. Urbach (ed.), Oxford, Pergamon Press, 1969, p. 569-580. 39 refs.*

The electrophoretic test on normal human blood serum exposed to light in the presence of an active polycyclic hydrocarbon shows that photooxidation produces aggregation, diminution of the tinctorial affinity, and increased migration rate in the electric field of definite protein fractions. Polycyclic hydrocarbons exert a photodynamic action which is highly associated with carcinogenic activity; this correlation is evident when definite tests are employed such as blood-serum photooxidation revealed by electrosphoresis and Saccharomyces cerevisiae survival curves. The study of mitochondria swelling by photodynamic action of polycyclic hydrocarbons has shown that such chemicals can interact promptly with mitochondria membranes and/or with the intrastructural components following natural membrane damage by light. Both behaviors are independent of carcinogenicity. In vivo experiments set up to underscore the possible importance of photodynamic action of 3,4-benzpyrene in carcinogenic processes have demonstrated that 3,4-benzpyrene is carcinogenic independently of light, and the 3,4-benzpyrene carcinogenicity can be influenced by Wood s light as well as by daylight with phenomena either of acceleration or of inhibition. The acceleration by light is interpreted as a process due to an excitation of 3,4-benzpyrene leading to a photodynamic process which is compatible with cellular life. The inhibition by light is interpreted as the consequence of a photodynamic process leading to severe damage of cellular and extracellular components rather than to the alteration of the carcinogen due to a photosensitized oxidation, thus decreasing its effective dose. (Author conclusions modified)

21718 APTIC NO. 40370

Schmaehl, Dietrich

CARCINOGENIC FACTORS IN THE ENVIRONMENT. *(Karzinogene Faktoren in der Umwelt). Text in German. Umschau (Frankfurt), 72(9):288-289, May 1972. 13 refs.*

The majority - possibily as many as 90% - of human cancers are caused by exogenous chemical or physical agents. These noxious factors do not necessarily originate in the pollution of the environment, since a good many cancerogenic agents are ubiquitous, or can be found in the natural environment or are incorporated by certain habits of living (e.g., smoking). Above all this applies to 3.4-benzpyrene, several mycotoxins, and several remedies. Even the fetus is exposed to carcinogenic danger. Benzo-(3,4)-pyrene is found in the air of large cities in concentrations of up to 400 micrograms/1000 cu m. During sunshine the concentration drops, since benzo-(3,4)-pyrene is destroyed by ultraviolet radiation. From the air, benzo-(3,4)-pyrene penetrates into the soil and water and is deposited on grass and plants. It is also found in excessive amounts in vegetables and salads. Washing with cold water removes only 10% of these hydrocarbons. A clear carcinogenic effect of benzpyrene was observed in mice after application of a total dose of 300 micrograms.

21719 APTIC NO. 39816

Seelig, M. G. and E. L. Benignus

COAL SMOKE SOOT AND TUMORS OF THE LUNG IN MICE. *Amer. J. Cancer, vol. 28:96-111, 1936. 22 refs.*

The relationship between the inhalation of coal smoke soot and the development of lung cancer was investigated in experimental studies with mice and correlated with the comparative incidence of lung cancer in humans residing in rural and urban communities. The soot was analyzed to determine relative concentrations of silica, tarry matter, whole sulfur, sulfur trioxide, and volatile salts including ammonia. Of the series of mice used in the studies, 8% of those exposed to the soot developed lung cancer in contrast to only 2% in the colony of control mice. In correlation, mortality tabulations indicated a greater incidence of lung cancer in city residents than among urban residents, suggesting a relationship between smoke soot and lung cancer in man.

21720 APTIC NO. 39858

Shafir, A. A., I. M. Lyadskaya, L. I. Ivanova, and A. A. Mikhailova

MICROCLIMATE AND MORBIDITY IN MULTISTORY HOUSES. *(Materialy o mikroklimate i zabolevaemosti naseleniya v domakh povyshennoi etazhnosti). Hyg. Sanit. (English translation from Russian of: Gigiena i Sanit.), 36(3):358-364, March 1971.*

NTIS: TT 71-50122

Carbon monoxide, carbon dioxide, and dust were measured in the air of five nine-story and one 12 story houses in Leningrad between 1964-1967. Atmospheric and microclimatic parameters were measured during a period of 6 or 7 days annually, in the seasons when heating was and was not in use. Morbidity from airborne infections and diseases of noninfectious etiology were studied in six nine-story and two 12-story houses. The quality of air in the apartments was found to deteriorate with the increase in height of the story. The morbidity rate from airborne infections was much higher among persons living on the upper floors. Sanitation methods are suggested, including adequate ventilation and the introduction of electric ranges in place of gas-burning devices.

21721 APTIC NO. 40313

Shandi, N. T. and M. L. Efron

EXCRETION OF DELTA-AMINOLEVULINIC ACID IN THE ABSENCE OF DEMONSTRABLE ERYTHROPOIESIS (33004). *Proc. Soc. Exp. Biol. Med., vol. 128:314-317, 1968. 8 refs.*

Delta-aminolevulinic acid (ALA), a precursor of heme synthesis, was present in normal amounts in the urine of patients without demonstrable erythropoiesis. The presence of true ALA in the urine of these patients was confirmed by a new method using an automatic amino-acid analyzer. By this method, the interfering substances such as glucosamine and amino acetone were eliminated. (Author conclusions)

21722 APTIC NO. 40441

Shishido, Masao, Kido Sugita, Fumio Higuchi, Fumihiko Ohya, Shogo Ochiai, and Takashi Mukaida

RELATIONSHIP BETWEEN THE EFFECT OF PHOTOCHEMICAL AIR POLLUTION ON MAN'S HEALTH AND AGENTS OF AIR POLLUTION (REPORT 1). *(Kokagaku taiki osen ni yoru kenko shogai no jittai to taiki osen yoin to no kankei. (Diippo)). Text in Japanese. Kogai to Taisaku (J. Pollution Control), 8(4):377-385, April 1972.*

The effect of photochemical air pollution on human health was studied by investigating 7,294 students from 23 schools in Yokohama and Kawasaki cities ranging from grade school to high school. Observed values of 12 factors including sulfur dioxide, nitric oxide, nitrogen dioxide, carbon monoxide, saturated hydrocarbons, total hydrocarbons, oxidants, air direction, air flow rate, temperature, and humidity recorded at seven detecting stations were used as the photochemical air pollution conditions. Results showed that 94.8% of the male students and 95% of the female students were the victims at this high pollution area. The highest rate of self-conscious symptoms was at about 1 to 2 pm. The symptoms lasted for several hours for many cases, although most of the cases were well within 2 hours. Students 10 to 12 years old were the most affected. Combining with the observed concentrations of the pollutants and conditions, it was concluded that dust, total hydrocarbons, saturated hydrocarbons, temperature, and oxidants were the major factors.

21723 APTIC NO. 40769

Silver, Walter and Ramon Rodriguez-Torres

ELECTROCARDIOGRAPHIC STUDIES IN CHILDREN WITH LEAD POISONING. *Pediatrics, 41(6):1124-1127, June 1968. 16 refs.*

Electrocardiographic studies before and after treatment were performed in 30 children with lead poisoning. Abnormal electrocardiograms were present in 70% of the patients on admission. Six cases had tachycardia which persisted after treatment in only two. Atrial arrhythmias were found in five patients. Sinus rhythm was reestablished after treatment in all except the patient with left atrial rhythm. The P-R interval was shortened in four cases and prolonged in 2. After treatment, the patients (two) in whom the P-R interval was prolonged remained the same, while only one case of four with short P-R interval failed to return to normal. The QTc was prolonged in 15 patients on admission, and it became normal in all patients after treatment. Inverted T waves over the left precordium were found on admission in five patients. Only one failed to respond to treatment. An abnormally wide QRS-T angle was found in six patients on admission. The angle became normal in four patients but remained the same in two. The abnormalities described most likely represent myocardial damage.

21724 APTIC NO. 40317

Sobel, Raymond,

THE PSYCHIATRIC IMPLICATIONS OF ACCIDENTAL POISONING IN CHILDHOOD. Pediat. Clin. N. Amer., 17(3):653-685, Aug. 1970. 26 refs.

Childhood poisoning is a function primarily of parental psychopathology and family disturbance. Frequency of poisoning is unrelated to home safety, level of motor development, intelligence of the child, birth complications, and parental accident proneness. Childhood emotional disorder and accidental poisoning are related. Poisoning is one of the terminal links in a process which starts with a failure of mothering and leads to the frustration of a child's needs for dependency, autonomy and security. Poisoning is an act of defiance, a bid for attention, a coercive attempt to achieve dependency or an expression of anger deflected from the mother onto the self. Further attempts at education are likely to prove unavailing and more widespread use of safety devices is called for. The physician must treat accidental poisoning as a symptom of family disturbance. (Author summary modified)

21725 APTIC NO. 40021

Stankovic, M. and S. Milic

THE VALIDITY OF LABORATORY TESTS IN THE EXAMINATION OF LEAD EXPOSED WORKERS. *(Vrednost laboratorijskih testova kod pregleda radnika izlozenih olovu). Text in Yugoslavian. Arhiv Hig. Rada Toksikol. (Yugoslavia), 21(3):233-239, 1970. 20 refs.*

The validity of laboratory tests for the determination of lead levels was investigated on 317 workers occupationally exposed to lead. The increase in urinary elimation of lead, coproporphyrin and delta-amino levulinic acid (ALA) was evident. The determination of ALA proved to be the most sensitive test, suitable to define the quantity of metabolically active lead in the organism; ALA concentrations were highly correlative with urinary lead levels. The determination of ALA to creatinine ratio (ALA index) has no advantage over the simple expression of ALA in mg/l or in mg/100 ml urine.

21726 APTIC NO. 40223

Stock, Alfred and Wilhelm Zimmermann

FROM LONG INHALATION OF AIR CONTAINING MERCURY; ANIMAL EXPERIMENTS. *(Tierversuche ueber die Aufnahme von Quecksilber aus quecksilberhaltiger Luft). Text in German. Biochem. Z., vol. 216:243-248, 1929. 6 refs.*

The effect of mercury inhalation and its distribution in the organism was studied in Guinea pigs. After different durations of exposure to a mercury concentration of about 4 mg/cu m, one group of test animals was analysed immediately, while another group was kept in mercury-free air prior to analysis. Colorimetric determination with diphenylcarbazone was applied. The mercury content found in different organs was different according to the duration of the exposure. The deposition was most intensive during the first days of the treatment, while further exposure caused no more increase. The accumulation of mercury in the organism was higher after 8 than after 14 days. Steadily low contents were revealed in the stomach and intestines. The elimination in mercury-free air was very slow, as nearly half and one fourth of the original content was retained after three, four, and five weeks, respectively. The mercury was chiefly accumulated in the liver and lungs, while low and rapidly decreasing contents were revealed in other organs.

21727 APTIC NO. 40641

Strong, Lawrence E.

MERCURY POISONING. *J. Chem. Educ., 49(1):28-29, Jan. 1972. 2 refs.*

Both mercury (II) ions and trivalent arsenicals are poisonous, with a number of similar symptoms. Poisoning in both cases can be alleviated by treatment with a 2,3-dimercaptopropanol (BAL). The chemistry of the situation shows the role of similarities in molecular structure and competition among complexes controlled by equilibria. In the metabolism of glucose, a key step is the formation of acetyl-coenzyme A by the transfer of an acetyl group to coenzyme A. The linkage between coenzyme A and the acetyl group is through a sulfur atom that in coenzyme A is present as a sulfhydryl group. The linkage is done through the intervention of a lipoic acid derivative, where the lipoyl group has been reduced to two sulfhydryl groups. The sulfhydryl groups should be linked to an acetyl group coming from thiamine diphosphate. However, the spacing of the two groups allows ready combination with an arsenite group or a mercury (II) ion to form a stable lipoylarsenite complex. This blocks an essential step in the metabolism reactions for glucose. An antidote for these two poisons been constructed as a molecule that has two sulfhydryl groups separated by two carbon atoms. Thus, BAL serves an effective antidote. It forms a stable complex with arsenite or mercury so that a moderate concentration of BAL can shift the equilibrium in a direction that leaves the lipoyl residue free to play its proper role in aceytl transfer. Complexed with BAL, the aresnite or mercury is excreted from the body.

21728 APTIC NO. 40124

Sugita, Kido, Masao Shishido, and Fumio Higuchi

RELATIONSHIP OF SYMPTOMS OF BRONCHIAL ASTHMA TO WEATHER AND SO2 IN SCHOOLCHILDREN. *(Zensokuji no hassaku to SO2 oyobi kisho to no kankei). Text in Japanese. Taiki Osen Kenkyu (J. Japan Soc. Air Pollution), 6(1):145, 1971. (Presented at the National Council Meeting of Air Pollution Studies, 12th, Nagoya, Japan, Oct. 27-29, 1971.)*

The effects of weather conditions and sulfur dioxide on four schoolchildren having bronchial asthma, two in industrial areas and two in residential area, were studied. Three symptoms of bronchial asthma and seven affecting factors including SO2 concentration, average atmospheric pressure, average temperature, relative humidity, average wind speed, visibility, and temperature change were used for the calculation of the relationship between the symptom and the factors by giving points to each symptom and factor. For the first child from the industrial area, no relationship was found, whereas the second child showed a minus relationship with the visibility during a period of three months. The first child from the residential area showed relationships with both SO2 concentration and the temperature change at different periods, while the second child showed a minus relationship with average temperature.

21729 APTIC NO. 39826

Sulzberger, Marion B.

SKIN EFFECTS OF AIR POLLUTANTS. *Interdepartmental Committee on Air Pollution, Washington, D. C., Air Pollut., Proc. U. S. Tech. Conf., Washington, D. C., 1950, p. 462-467. 1 ref. (May 3-5, Louis C. McCabe, ed.)*

Substances which can possibly produce systemic poisoning via skin penetration are listed, and include aromatic amines and nitro compounds, arsenic, lead (organic compounds), mercury, phenol, and vesicant war gases. In most instances, the concentrations and amounts of such substances suspended or dissolved in the air are of such relatively low magnitude that acute systemic poisoning from the air via the skin is not produced. However constant and repeated exposures to certain dusts and suspended particles can produce a variety of skin diseases, including blackheads, keratoses, precancers and cancers, urticarial eruptions from allergenic dusts, dermatitis, and infections.

21730 *APTIC NO. 39827*

Tabershaw, Irving R.

CHEMICALLY ACTIVE AIR POLLUTANTS. Interdepartmental Committee on Air Pollution, Washington, D. C., Air Pollut., Proc. U. S. Tech. Conf., Washington, D. C., 1950, p. 468-473. 3 refs. (May 3-5, Louis C. McCabe, ed.)

Evaluation of toxic effects of chemically active air pollutants must take into account the effectiveness of body defenses, the length of time of action, and the concentration of the inhaled or ingested poison. Physical factors such as particle size, shape, and solubility also affect toxicity. In spite of the difficulty in determining precise causal relation between air pollutants and chronic disease, there is no doubt that many of these substances can and do initiate or aggravate pathologic processes. Evidence establishing beryllium and its compounds as the etiologic factor in illness of persons living near certain industrial plants is discussed.

21731 APTIC NO. 40264

Tanaka, Masashi and Hidenori Dodo

EFFECT OF AIR POLLUTION ON RESPIRATORY APPARATUS IN OTAKE, KURE AND FUKUYAMA CITIES (1970 FISCAL YEAR). *(Otake, Kure oyobi Fukuyama-shi ni okeru taikiosen no kokyuki ni oyobosu eikyo. (Showa 45 nendo)). Text in Japanese. Hiroshima Igaku (J. Hiroshima Med. Assoc.), 25(2):220-234, Feb. 1972. 6 refs.*

The effects of air pollution on pulmonary function were examined in residents over 40 years old in Otake, Kure, and Fukuyama cities. Data on vital capacity, capacity per second, height, blood pressure, urine tests, and chest x-ray examinations were collected. Interviews using questionnaires were also used to determine subjective symptoms. The prevalence of respiratory symptoms was classified by area and sex and correlated with health examinations and smoking habits. The prevalence of respiratory diseases in smokers was generally higher than that in non-smokers or former smokers. Differences in pulmonary function test values were determined between each area. In the survey on subjective symptoms, the ratio of complaints was generally higher in the polluted survey areas than in the control area.

21732 APTIC NO. 39949

Teti, M. and G. Graziani

THE ACTION OF CERTAIN GASES ON ROUS SARCOMA. *(Azione di alcuni gas sul virus del sarcoma di Rous). Text in Italian. Riv. Patol. Sper., vol. 27:35-48, 1941. 27 refs.*

The effect of oxygen, carbon dioxide, carbon monoxide, and nitric oxide on Rous sarcoma was investigated. The gases were introduced directly into 5-10% tumor extract in physiological solution and perfusion liquid. The CO2 and NO markedly decreased the activity of the tumor agent; CO showed a slight effect; 02 had only a very little effect if any. The addition of light to the gases exerted no remarkable influence on O2 and CO2. However, it abolished the effect of NO and CO, reestablishing the activity of the tumor agent. This action is reversible and presumably due to a photochemical effect on the biological complex of the agent. (Author summary modified)

21733 APTIC NO. 40137

Tomaru, Masaaki, Junzaburo Kabe, and Tatsushi Ishizaki

CLINICAL STUDY OF THE EFFECTS OF AIR POLLUTION UPON ASTHMATIC PATIENTS. *(Zensoku hassaku ni oyobosu taiki osen no eikyo). Text in Japanese. Taiki Osen Kenkyu (J. Japan Soc. of Air Pollution), 6(1):148, 1971. (Presented at the National Council Meeting of Air Pollution Studies, 12th, Nagoya, Japan, Oct. 27-29, 1971.)*

Fifteen patients with atopic asthma were subjected to the studies of the effects of air pollution on the symptoms. During more than 2 months, the change of daily average temperature was 0-10 C, and the weather condition was either clear or cloudy. Therefore, the effect of weather conditions was considered negligible. The daily change of sulfur dioxide concentration was 0.03 to 0.28 ppm, and the daily average concentration was 0.09 to 0.13 ppm. The concentrations of particulates in air were measured and divided into low, medium, and high concentrations. The high concentrations of SO2 and particulates caused patients to suffer worse symptom. High concentrations of either SO2 or particulates also affected the occurrence of the symptoms.

21734 APTIC NO. 40565

Toth, Bela

A CRITICAL REVIEW OF EXPERIMENTS IN CHEMICAL CARCINOGENESIS USING NEWBORN ANIMALS. *Cancer Res., vol. 28:727-738, April 1968. 118 refs.*

Experiments using newborn and older animals of 17 strains of mice and 2 strains of rats, studied for their susceptibility to 12 carcinogenic chemicals, are summarized. In considering all types of tumors, four investigations claim that newborn animals are more susceptible to carcinogenic chemicals than are older animals. However, in studies in which only one or two tissues were investigated, lymphoreticular tissue, lung, liver, and skin yielded more tumors when the chemicals were administered neonatally than at older ages. On the other hand, subcutaneous tissue, skin, breast, kidney, and vascular tissues provided more tumors when the chemicals were given at older ages than at birth. In one study lung, and in another, lymphoreticular tissue developed more tumors when the carcinogen was given to 2-week-old animals instead of to younger or older animals. Each experiment is evaluated. Certain factors--anatomic, viral, and metabolic--whose involvement in carcinogenesis was shown to be modulated by age, evolved gradually from these studies, although their exact influences are still unknown. (Author summary modified)

21735 APTIC NO. 39824

Townsend, J. G.

SHORT-RANGE EXPOSURE TO HIGH CONCENTRATIONS OF AIR POLLUTANTS. *Interdepartmental Committee on Air Pollution, Washington, D. C., Air Pollut., Proc. U. S. Tech. Conf., Washington, D. C., 1950, p. 451-454. (May 3-5, Louis C. McCabe, ed.)*

Investigations of the Meuse Valley and Donora air pollution episodes have revealed that the persons most severely affected in both instances were the aged, who had been suffering from previously existent cardiorespiratory diseases. In the Meuse Valley report it was concluded that sulfur dioxide and its oxidative products caused the injurious effects, while the Donora report concluded that there probably was not sufficient concentration of any one substance in the air during the smog to have caused the illnesses. Studies show that inhalation of pollutants causes an irritation of the nose, throat, and lungs. An increase in the incidence of acute pulmonary diseases and a higher pneumonia death rate are attributed to air pollution. Another of the varying influences of air pollutants is an allergic effect on the respiratory tract.

21736 APTIC NO. 39989

Tsuchiya, Kensaburo

EFFECT OF LEAD ON HUMAN BODY. *(Namari no jintai ni taisuru eikyo). Text in Japanese. Namari to Aen (Lead Zinc), 9(2):23-26, March 1972.*

There has been no proven case of lead poisoning by airborne lead reported anywhere in the world. Cases of lead poisoning have been reported and known only as an occupational disease, especially in storage battery manufacturing firms. There is a definite relation between exposure to a poisonous chemical substance and human reaction. A man does not give abnormal symptoms until the exposure exceeds a certain degree. Once this limit is exceeded, rate of the poisoning is 100%. When plotted in a chart, this relation is indicated in S curve. Most of lead is taken in with food and through the digestive organs. The average Japanese takes in 0.3 mg/day lead from his diet. Lead is also taken in and absorbed through respiratory organs. Most of lead absorbed through the lungs goes directly into the circulation system, enters the liver, and is then deposited in the bones or discharged together with human waste. Lead carried by blood adheres to surfaces of globules. Part of the lead circulating with the blood enters the marrow where it disturbs the production of hemoglobin. Some of the lead reaches nerves and muscles where it ionizizes, causing breakdown of the ion equilibrium around the cells of smooth muscles and consequently paralysis of the muscles. Symptoms and diagnosis of lead poisoning are discussed at some length.

21737 APTIC NO. 40527

Tsunoda, Fumio

FLUORIDES AS AIR POLLUTANTS. PREVENTIVE TECHNOLOGY. POLLUTION IN ALUMINUM METALLURGY. *(Fukkabutsu ni yoru taiki osen boshi gijuts no genjo to tenbo). Text in Japanese. Kinzoku (Metals) (Tokyo), 41(1):122-125, Jan. 1971. 9 refs.*

Fluorine in the air easily reacts to dust, soot, and other inorganic matter. It is easily adsorbed by flue gas and reacts to vapor in the air to form hydrogen fluoride. Even the smallest amount of fluorides give a considerable damage to plants such as pine, iris, and gladioli. Furthermore, fluorides are accumulated in the plant leaves in polluted areas, and cause chronic fluoride poisoning of silkworms, cattle, and other animals that feed on such plants. The effects of fluorides in the air to human health is not severe if the content is on the order of the present 0.75 mg. However, fluoride can accumulate by consumption of agricultural produce grown in the areas that are polluted. There is a considerable amount of fluoride in rice and vegetables. Accumulation of fluoride taken over along period of time can cause chronic poisoning such as streaked teeth or hardening of bones. In the past, mass poisoning occurred in the area where natural ground water contained more than 1 ppm of fluorine or in crystal mines. Streaked teeth appear only when a child takes in a large dosage of fluorine daily between his infancy and 8 years old. Taking the same dosage after maturation does not cause streaked teeth. However hardening of bones will occur. Various methods of treating fluoride containing gas are reviewed. Spray tower, venturi scrubber, water jet scrubber, packed tower, and floating bed scrubber are compared. The most efficient are venturi scrubber and floating bed scrubber; but the operation is extremely costly.

21738 APTIC NO. 39830

Vorwald, Arthur J.

EFFECTS OF INERT DUSTS IN AIR POLLUTION. *Interdepartmental Committee on Air Pollution, Washington, D. C., Air Pollut., Proc. U. S. Tech. Conf., Washington, D. C., p. 485-488. (May 3-5, Louis C. McCabe, ed.)*

Although dusts may be inherently inert, certain factors may cause the substance to produce pulmonary change or to interfere with function. The factors include the physical and chemical character of the substance, its concentration in the atmosphere under varying degrees of temperature and humidity, the amount of the substance inhaled and retained in the lung, the duration of exposure of the individual inhaling the substance, and the state of the respiratory tract including the trachea, bronchi, lungs, and pulmonary vascular bed. The chemical composition of an inert substance may undergo change induced by an industrial process; consequently, the airborne particles of the transformed substance become active and capable of stimulating an inflammatory response when inhaled into the lung. The inert particles may act as carriers of a gas, an allergen, a biologic agent, or other contaminant. Anatomic changes which occur in the lung following the inhalation of an inert dust are briefly described.

21739 APTIC NO. 4044

Watanabe, Shinya, Yasuma Fukuchi, and Kinzo Wakaba

RESPIRATORY EFFECTS OF AIR POLLUTION IN COLD WATER. *(Kanrei chi ni okeru toki taiki osen to kokyuki shogai (Diippo)). Text in Japanese. Taiki Osen Kenkyu (J. Japan Soc. Air Pollution), 6(1):149, 1971. (Presented at the National Council Meeting of Air Pollution Studies, 12th, Nagoya, Japan, Oct. 27-29, 1971.)*

The effects of air pollution on the respiratory organs of men and women in Muroran City were investigated. About 60% of the population over 40 years old both in high and low pollution areas was subjected to the study. The number of persons having chronic bronchitis was 15.4% for men in high polluted areas compared to 10.1% in low-polluted, and 8.2% for women in high-polluted areas, compared to 3.1% for women in low-polluted areas.

21740 APTIC NO. 39835

Wittich, F. W.

RESPIRATORY TRACT ALLERGIC EFFECTS FROM CHEMICAL AIR POLLUTION *Interdepartmental Committee on Air Pollution, Washington, D. C., Air Pollut., Proc. U. S. Tech. Conf., Washington, D. C., 1950, p. 520-528. 3 refs. (May 3-5, Louis C. McCabe, ed.)*

The dissemination of organic materials, as fumes and particulate matter from the manufacture of linseed oil, lead pencils, cedar oil, castor oil, malt, paint, paper, and stock feeds, as well as dusts from cotton gins, feed mills, flour mills, seed mills, or the storage or handling of grains, is a common cause of respiratory allergies. Smuts appear in large amounts near the grain storage centers in Minneapolis; cases of contact dermatitis are seen, as well as the atopic forms of skin allergy, perennial rhinitis and asthma. Smuts also appear to be responsible for some of the symptoms of hay fever and asthma occurring between pollen seasons. Specific offending allergenic agents, known as haptens, consist of conjugated proteins resulting from a combination of proteins with numerous chemical substances. Allergic individuals, sensitive to these chemical-protein combinations, may develop symptoms from exposure to them when they are not affected alone by either the chemical or the protein in the conjugate. Numerous insecticides in common use are shown to have allergenic specificity because of the chemicals used. Asthmatic attacks are not infrequently attributed to paradichlorbenzene, naphthalene, and camphor contained in insecticides. Asthma among furriers is also common, the controversial offender being the dye, paraphenylenediamine. Chromic acid vapor is reported as the cause of asthma in individuals working with chromium plating.

21741 APTIC NO. 40145

Yamanaka, Akira, Shigeki Saiki, and Kiyonori Kawai

AIR POLLUTION AND RESPIRATORY DISEASE - FROM THE STANDPOINT OF PATHOMORPHOLOGY. *(Taikiosen to kokyuki shikkan-Byorikeitai-gaku no tachoba kara). Text in Japanese. Hai to Shin (Lung Heart), 19(1):20-29, March 1972. 14 refs.*

Animal experiments on the inhalation of combustion gases are discussed. According to two experiments, significant changes in the capillary endothelium of alveoli were found by electron microscope. Morphological differences were observed between the mice exposed to filtered gases and those exposed to non-treated gases. Also, 150 lung autopsies were examined concerning the deposition of carbon dust and fibrous lesions as indices of pollution level. Twenty autopsies from the Central Hospital of Asahi City in Chiba Prefecture were compared as a control group. However, deposition of carbon dust was found in a considerably large number of autopsies from the control group. Most cases showed carnification in the lesions. Chronic pneumonia was common. Apical fibrous lesions increased with the increase of age; it was 2.5 times more common in men than in women. Since the total number of autopsies was few, it is difficult to conclude its propriety as an index of pollution level. But a significant difference was observed between the polluted group and the control group compared with the difference in the deposition of carbon dust. The etiology of diffuse panbronchiolitis was also studied. Causative factors of this diseases have not been clearly found yet.

21742 APTIC NO. 40118

Yokoyama, Eiji

LUNG AND INDUSTRIAL ENVIRONMENT, AND NO2 AND OZONE IN URBAN ATMOSPHERE. *(Hai to shokuba kankyo oyobi toshi taikichu no nisanka chisso ozon ni tsuite). Text in Japanese. Fuel Society of Japan, Tokyo, p. 7-8, 1971. (Presented at the Fuel Society of Japan, Lecture Meeting on Nitrogen Oxides, Sept. 1971.)*

Nitrogen oxides, mainly as nitrogen dioxide, are generated as by-products from various industrial production processes, such as the manufacturing of explosives, pigments, and nitric acid. They cause lung diseases such as Silo-filler disease in agriculture. Nitrogen dioxide is the main component in the urban atmosphere, and with ozone, it plays the major role in the formation of photochemical smog. Nitrogen dioxide and O3 are both oxidative gases. They have little solubility in water but easily penetrate the respiratory tract when inhaled. These gases cause bronchitis obliterans and lung edema easily. Experimental results showed that NO? and O3 differ in their behavior in the lung compared to sulfur dioxide.

21743 APTIC NO. 40146

Yoshida, Kat i

AFTERMATH OF TH5E YOKKAICHI ASTHMA EPIDEMIC. *(Yokkaichi zensoku no sonogo) Text in Japanese. Rodo no Kagaku Dig. Sci. Labour, 27(2/3):62-65, March 1972. 5 refs.*

Regarding environmental hazards by oil complexes centering around the Shiohama district, the condition of pollution from the beginning of operation in 1965 to the present and the relief measures for recognized and approved patients of atmosphe1ric 5pollution are summarized. Patients with bronchial asthma began to increase greatly in 1962; 7% of the cases were in their forties and 10% in the fifties in 1963. In the same year, the investigation commission of the Ministries of Health and Welfare and International Trade and Industry for environmental hazards at Yokkaichi advised of the necessity of the establishment of measures for removing high concentration peak pollution and of the provision of medical 5relief for patients including purified air rooms. Medical aids were provided in 1965 and the relief regulation for environmental hazard sufferers became effective in 1970. In the Isozu district, the number of patients has greatly decreased as stacks became higher since 1966, and the concentration of sulfur oxides had decreased. New patients have decreased recently. The ratio of the recognized and approved patients in the Isozu district to the whole city, which was 25% in 1965, decreased to 14.2% in 1971. However, the number of patients in the neighboring districts increased due to raising of height of chimneys. In primary school children, the number of cases in boys is nearly twice that in girls. However, following an increase in ages in junior and senior high schools, there is a decreasing trend in the number of patients, indicating the effectiveness of medical aids to these age groups.

EFFECTS-PLANTS AND LIVESTOCK

21744 APTIC NO. 40540

LEAD FROM THE EXHAUST GASES OF AUTOMOBILES IN GREEN CABBAGE. *(Blei aus Kraftfahrzeugabgasen in Gruenkohl). Text in German. Deut. Med. Wochenschr., 97(21):856, May 1972.*

Examinations of a large number of green cabbage samples taken various distances from highways and roads revealed that the lead concentration was higher in plants that grew closer to the road. The fraction of the total lead content which could be washed off was small and ranged on the average around 10%. Boiled samples generally contained more lead than unboiled ones with the use of an enamelled pot for boiling. No increase of the lead content was observed when the samples were boiled in glass dishes.

21745 APTIC NO. 40473

Barnes, Robert L.

EFFECTS OF CHRONIC EXPOSURE TO OZONE ON PHOTOSYNTHESIS AND RESPIRATION OF PINES. *Environ. Pollut., 3(2):133-138, April 1972. 6 refs.*

Studies were conducted in a laboratory on seedlings of four species of pine which were exposed to either 5 or 15 pphm of ozone for periods from 5-18 weeks. Changes in rates of photosynthesis and respiration occurred. Ozone at 5 pphm had variable effects on photosynthesis, depending on species and age of foliage. Little effect was noted with younger seedlings of white pine, which bore only primary needles, while photosynthesis was depressed slightly in secondary needles of older seedlings. With the yellow pines (slash, pond, and loblolly) a possible stimulation occurred in older secondary needles, but photosynthesis was usually depressed in younger secondary needles. The higher ozone concentration (15 pphm) had a more consistent depressing effect on all species. The most clearcut effect of ozone was on respiration. Although 5 pphm was not always effective, a concentration of 1 pphm stimulated respiration consistently, in one case as much as 90%.

21746 APTIC NO. 40586

Bartells, G. C, Jr.

DISAPPEARANCE OF SULPHUR DIOXIDE FROM DILUTE MIXTURES OF SULPHUR DIOXIDE WITH AIR. *Bull. Bureau Mines, no. 98:308-323, 503-520, 1915. 86 refs.*

Experiments to determine the rate of disappearance of sulfur dioxide from mixtures of SO2 and air in a closed glass carboy showed that SO2 disappeared very rapidly and almost completely when in contact with green vegetation. This was due to simple absorption of SO2 by the live plant and to a small degree, to the oxidation of SO2 in an excess of moist air and the adsorptive property of the glass. When a mixture of SO2 and air in a glass container was exposed for a considerable period in a dry atmosphere in diffused light, only about 10% of the SO2 disappeared within 30 hr. This was due in part to oxidation of SO2 during prolonged contact with air, partly to loss by diffusion, and partly to the adsorptive property of the glass. When SO2 was mixed with air containing moisture to the point of 100% saturation, the rate of disappearance of SO2 was much greater and the disappearance more nearly complete than under any other conditions. This was due mostly to the adsorption of SO2 on the glass surface. Disappearance of SO2 from a mixture of SO2 and air exposed to direct sunlight was gradual, the rate of disappearance being greatest when the temperature in the carboy was highest. A part of the SO2 as adsorbed, the amount varying with the amount of water present. In all tests, both oxidation and absorption took place. Each occurred to a greater degree in moist air.

21747 APTIC NO. 40290

Bioletti, Frederic T. and William V. Cruess

ENOLOGICAL INVESTIGATIONS. *Calif., Agr. Exp. Sta. Bull., no. 230, 119p., 1912. 1 ref.*

The principal improvements in the art of wine-making during the past 25 years are the accurate and intelligent use of sulfurous acid, the application of pure yeast to the fermentation of grapes, and the control of temperature in every stage of the process. Proper use of sulfurous acid has made it possible to avoid completely the production of spoiled wines. High volatile acid, unfermented sugar, and persistent cloudiness, defects due in nearly all cases to bacterial growth, can be completely eliminated. The application of yeast may not in every case enable the wine maker to improve his best wine, but it will give much greater certainty to his operations and undoubtedly improve the average quality and increase the uniformity of his product. By restricting the rise of temperature during violent fermentation and maintaining it after fermentation, the delicacy and finer qualities of the wine can be greatly improved. Refrigerating the wine to a suitable degree after the elimination of the sugar promotes its rapid clarification by the precipitation and deposition of salts, microorganisms, and the other solid matter which often forms a persistent cloudiness in defectively handled wines. Investigations are described which were made to determine to what degree the injurious microorganisms could be eliminated and the wine yeast encouraged by the use of sulfurous acid and pure yeast, and to discover the best methods and doses in various cases.

21748 APTIC NO. 40420

Bromfield, A. R.

ABSORPTION OF ATMOSPHERIC SULPHUR BY MUSTARD (SINAPIS ALBA) GROWN IN A GLASSHOUSE. *J. Agr. Sci., vol. 78:343-344, April 1972. 6 refs.*

An experiment to measure the gaseous sulfur absorbed by mustard was performed at Rothamsted during the summer (May-July) of 1968. The plants were grown in 15 pots of sulfur-free quartz chips and nourished with 1/5 strength Hoagland nutrient solution containing 6 ppm sulfur as sulfate with a specific activity (S.A.) of 1 microcurie/mg. A 0.2 g aliquot of the ground plant material was treated with an ethanolic magnesium acetate solution, dried, ashed at 450 C for 2 hr, dissolved in hydrochloric acid, and made to 25 ml with distilled water; total S in a 5 ml aliquot was determined using a Technicon AutoAnalyser. Controls prepared from plants not receiving S-35 were used to measure background count-rates. The results showed that 1 mg S/pot had been taken from the atmosphere at 24 days and this had increased by 35.8 mg in the next 20 days, while the total S increased from 6.2 mg S/pot to 74.7. Therefore, between 24 and 44 days, 52.5% of the plant S had been taken from the atmosphere. The S in the nutrient solution was probably adequate when growth was slow and plant uptake small (up to 24 days) but became inadequate for mustard when it grew faster. From the increased uptake of atmospheric S per pot between 24 and 44 days, the area occupied by a pot, and the mean S concentration in the air, a deposition rate of 18.6 times 10 to the minus 12th power g S/sq cm/sec and a vertical deposition velocity constant of 0.74 cm/sec were calculated. Compensating for some atmospheric S which must have been in roots (not harvested), the corrected velocity constant would be approximately 1.0 cm/sec, which is 4-5 times that measured for deposition on a horizontal surface. This implies that mustard grown under these conditions has a total leaf area absorbing S which is 4-5 times the area of soil on which it is grown. With the concentration of S found in the atmosphere and the same amounts available in the soil, mustard grown on 1 hectare of soil would, in 20 days, absorb 4.3 kg S.

21749 APTIC NO. 39902

Bursche, Eva-Maria

VEGETATION DAMAGE BY FLUORINE. *(Vegetationsschaeden durch Fluor). Text in German. Schriftenreihe Ver. Wasser Boden Lufthyg. (Berlin), no. 10:39-83, 1955. 43 refs.*

Laboratory tests were carried out to elaborate methods for recognizing and diagnosing plant damage produced by fluorine smoke. Brown to black ends and discolored edges were observed on leaves from open-air and artificially smoke-exposed plants. The resistances of different plants were investigated. Microscopic observations revealed slightly creased epidermis and badly creased parenchyma. The cell content formed a homogeneous brown mass in badly damaged leaves. Coloration due to fluorine and natural processes were separated in tissue investigations. Plasmolytic experiments were carried out for diagnosing chronic, acute, and invisible damage with NaF and NaCl. In Fontinalis antipyretica, 0.03% NaF-solution constituted the threshold limit while NaCl was much less harmful. No influence of the toxic effects of NaF and NaCl on the rate of plasmolysis could be revealed. Cells damaged by NaF (separation of protoplasts from the cell walls and slight plasmolysis) were regenerated after the normal conditions were restored. Hydrofluoric acid was more harmful than sodium fluoride. Elodea densa was damaged by a 0.0008% hydrofluoric acid solution. A special spectrophotometric method that permits determination of a typical acid effect only is explained. Chlorophyll extracts from damaged leaves showed a band of 535 micromicron, of different intensities depending on the actual fluorine content. Experiments were carried out to detect fluorine in plants by means of the methemoglobin method. A minimum of 0.01% of NaF in pure NaF solution could be satisfactorily detected. The method for dissolving the leaf material for fluorine detection is not sensitive enough. The characteristic fluorine methemoglobin-hemoglobin band could be obtained for leaf material artificially damaged by 40%-HF, and ashed.

21750 APTIC NO. 40589

Doane, R. W.

INSECT PESTS IN THE SELBY SMOKE ZONE. *Bull. Bureau Mines, no. 98: 428-450, 503-520, 1915. 86 refs.*

The poor condition of many orchards in the Vallejo and Benicia region is due to lack of cultivation, pruning, and spraying, and not to smoke from the Selby smelter. Trees in the area are infested with several species of scale insects, aphids, mites, leaf hoppers, thrips, and beetles. The damage caused by these insect pests is often mistaken for injury due to smelter smoke.

21751 APTIC NO. 39798

Donaubauer, F.

SECONDARY DAMAGES OF FORESTS CAUSED BY INDUSTRIAL EXHAUST FUMES. *(Durch Industrie-abgase bedingte Sekundaerschaeden am Wald). Text in German. Mitt. Forst Bundesvers., no 73:101-110, 1966. 26 refs. (Presented at the Symposium on Smoke Damage to Forests in Austria, Vienna, Austria, Nov. 9-11, 1965.)*

Secondary damage to forests caused by industrial emissions are reviewed with special regard to pests. Reduced light absorption of leaves due to dust build-up and the proliferation of weeds are some of the indirect damages involved in emissions. Reduced resistance of trees to frost and the proliferation of fungi, insects, and other pests are the secondary effects of emissions. The regression of certain fungi (Rhytisma species) in emission affected areas cannot be regarded as positive. The proliferation of the harmful Armillaria mellea is favored by emissions. Increased proliferation of insects such as Adelges laricis, Pissodes harcyniae Hrbst., P. scabricollis Mill., Cryphalus piceae Rtzb., and C. abietis Rtzb. was observed. Massive increase of Laspeyresia pactolana Z., Epinotia tedella

Cl., Rhyacionia buoliana Schiff., Exoteleia dodecella L., and Pristiphora abietina Christ. was found in smoke-damaged forests. Damages caused by such secondary effects can hardly be evaluated.

21752 APTIC NO. 39991

Evans, Lance S. and Paul R. Miller

OZONE DAMAGE TO PONDEROSA PINE: A HISTOLOGICAL AND HISTOCHEMICAL APPRAISAL. *Am. J. Botany, 59(3):297-304, 1972. 12 refs.*

Experiments were conducted to observe and identify the early histological and histochemical effects of ozone injury in Pinus ponderosa needles and to provide an additional diagnostic procedure. Clonal plant material was obtained by grafting branchlets from a single, sensitive ponderosa pine on ponderosa seedlings in containers, which were then subjected to carefully monitored amounts of an ozone-air mixture. Fifteen, 20, and 30 micron slices from various parts of the leaf were stained and examined. Carbohydrates, proteins, nucleic acids, pectins, calcium, and two enzymes were localized histochemically. The plicate mesophyll cells were most sensitive to ozone fumigation, showing various degrees of damage in different parts within the cell. The walls of the mesophyll cells were abnormally folded and twisted following chloroplast aggregation. Histochemical assays revealed further ozone damage related changes within the mesophyll cells. Cell damage appears to begin in the median abaxial portions of the leaf and eventually spreads throughout the leaf. Visible symptoms appeared 2-3 weeks after the start of fumigation, while histological and histochemical assays revealed ozone injury within 5 days.

21753 APTIC NO. 39803

Feder, William A.

MODIFYING THE ENVIRONMNET. *HortScience, 5(4):247-249, Aug. 1970. 44 refs.*

Measures that might be taken to protect plants from various pollutants, either by cultural manipulation or by various chemical or mechanical devices, are outlined. Complex relationships exist between temperature, humidity, light, and stomatal function. Both high and low temperatures for one or more days prior to ozone exposure reduce plant sensitivity. Plants held on the dry side are less damaged by air pollutants. Injury to irrigated crops, either in the field or greenhouse could be moderated by astute timing of irrigation cycles and close attention to soil moisture levels. Plants grown under lights in a temperature-controlled greenhouse could have their stomatal functions manipulated by varying light intensity and quality. The nutritional status of the growing plant also influences its sensitivity to pollution injury. The role of the physiologic state of the plant as it relates to air pollution sensitivity could be explored by experimentation with plant growth substances. Attempts to protect plants from air pollutants by mechanical devices and by direct application of chemicals are described. Destruction of ozone at the leaf surface can be achieved using anti-oxidants and anti-ozonates. Ozone is also destroyed by finely divided iron oxide, zeolites, silica gel, or activated carbon. To date, none of these dusts and sprays are economically feasible for full scale application. The use of activated charcoal filters for the prevention of air pollution damage is also reported.

21754 APTIC NO. 39933

Formad, Robert J.

THE EFFECT OF SMELTER FUMES UPON THE LIVESTOCK INDUSTRY IN THE NORTHWEST. *Dept. of Agriculture, Washington, D. C., Pathological Div., Bureau of Animal Industry Rept. 25, p. 237-268, 1908. 54 refs.*

The effects of copper smelter fumes on the livestock industry in Deer Lodge Valley, Montana were investigated. Pastures, soil, water supply, hay, sheds, and stables were examined along with the physical conditions of the animals. Large amounts of arsenic were determined in grass, hay, leaves, and tree bark. Livestock losses were estimated from records; of a total 2447 horses in 1902, only 423 remained in 1906, and the losses in cattle were even greater. Animal experiments with arsenic poisoning were conducted to compare the experimental results with the clinical symptoms of the Deer Lodge vally livestock. The symptoms varied with the kind of forage consumed by the animals, but included as an effect of the fumes a failure to conceive, abortion, and finally sterility. Losses due to failure to conceive and abortion ranged within 30-60%. Pathological examinations on post mortems showed lesions of chronic catarrhal inflammation of the stomach, intestines, lungs, and kidneys and inflammatory cell proliferation in the mucous membranes of the stomach and intestines, the liver, the lung, and the kidneys.

21755 APTIC NO. 40099

Francisco, Donald E. and J. K. G. Silvey

THE EFFECT OF CARBON MONOXIDE INHIBITION ON THE GROWTH OF AN AQUATIC STREPTOMYCETE. *Can. J. Microbiol., 17(3):347-351, March 1971. 24 refs.*

Primary mycelium of aquatic streptomycetes is facultatively aerobic while the seconday mycelium is obligately aerobic. The nature of the differences in aerobic metabolism of various morphological phases in the life history was determined by carbon monoxide inhibition. A slide culture chamber technique which allowed continuous microscopic observation of the growing organism while in various gas environments was used. Two distinct patterns of inhibition were observed. The development of early stages of the life history was inhibited by carbon monoxide in the light and dark. The site of this inhibition could not be determined. The later stages were inhibited only by carbon monoxide in the dark. This suggested a dependence of the secondary mycelium on the activity of cytochrome oxidase. Thus, the primary and secondary mycelial stages were physiologically distinct. (Author abstract modified)

21756 APTIC NO. 39917

Gabelman, W. H.

ALLEVIATING THE EFFECTS OF POLLUTION BY MODIFYING THE PLANT. *HortScience, 5(4):250-252, Aug. 1970. 6 refs.*

The thesis that genetic change and recombination provide a vehicle for permanent change by which plants may either exclude a pollutant from entering the plant or provide physiological systems which allow the plant to tolerate excesses of toxic pollutants is discussed. Both mechanisms are known to exist among plants adapted to low pH soils where manganese toxicity eliminates many species. The cranberry plant thrives in a soil pH of 4.0-4.5 and a tissue content of 3000-4000 ppm manganese. There are a variety of mechanisms involved in the accumulation of levels of soil pollutant minerals in the plant which are toxic to the ultimate consumer, and the magnitudes of differential absorption through the roots among various species is greater than generally realized. Two avenues through which air pollutants enter the leaf are generally recognized: by direct penetration of the cuticle and by diffusion through open stomata. The apparent differences in resistance and susceptibility to ozone injury by different species are generally accepted. The apparent heritability of resistance and susceptibility within a species is becoming more obvious. If responses to ozone can be detected in leaf discs, the technique can be modified to survey vast amounts of plant materials quickly.

21757 APTIC NO. 40341

Grzywacz, Andrzej

THE INFLUENCE OF INDUSTRIAL AIR POLLUTION ON PATHOLOGICAL FUNGI OF FOREST TREES. *(Wplyw przemyslowych zanieczyszczen powietrza na gr-*

zyby chorobotworcze drzew lesnych). Sylwan, 15(6):55-62, 1971. 28 refs. Translated from Polish. Scientific Translation Service, Inc., Santa Barbara, Calif., 13p.

The reaction of pathological fungi to the presence of air pollution is a function of the chemical nature of the pollutants, their concentration, the frequency of diurnal and seasonal changes in concentration, the duration of action, the composition of floras, the degree of damage by phytotoxins in the pollutants, the topography of the terrain, climatic conditions, the character of the forest site, and the sensitivity of the pathogens. The most important pollutants and their sources are reviewed, including sulfur dioxide, fluorine compounds, smog, and ozone formed from nitrogen oxides. The toxic action of SO2 with respect to fungi depends on the temperature and relative humidity of the air, increasing with an increase in relative humidity. The occurrence of pathological fungi in forests with polluted air, the effect of air pollution on certain vital processes of fungi, and the mechanism of action of the air pollutants on the fungi are considered.

21758 APTIC NO. 40335

Hammett, Frederick S.

STUDIES IN THE BIOLOGY OF METALS. III. THE LOCALIZATION OF LEAD WITHIN THE CELL OF THE GROWING ROOT. *Protoplasma, vol. 5:135- 141, 1928. 2 refs.*

A variety of tests on root tips of onion sets, white beans, and field corn proved definitely that lead is concentrated within the nucleus and walls of these cells. Roots which had been gwown in distilled water containing 10 to the minus 4th power concentrations of lead nitrate were used as experimental material. Sulfuric acid and sodium bicarbonate were used to precipitate lead sulfate and lead carbonate in cell walls. Sodium sulfide was used to precipitate lead sulfide in the nucleus. The nucleolus of corn appeared to have a selective affinity for lead combination not found in the other roots.

21759 APTIC NO. 40591

Haring, C. M. and K. F. Meyer

INVESTIGATION OF LIVE-STOCK CONDITIONS AND LOSSES IN THE SELBY SMOKE ZONE. *Bull. Bureau Mines, no. 98:474-520, 1915. 86 refs.*

During an investigation of livestock conditions at 32 ranches allegedly injured by smoke from the Selby smelter, 308 horses, 215 cattle, approximately 900 sheep, and about 500 swine were inspected. Post-mortem examinations were made on four horses, two heifers, and several hogs. No clinical evidence of injury from smelter smoke was found in cattle, hogs, or sheep. The effects of previous injury were evidenced by 30 cases of roaring in horses, of which 12 were carefully studied. The clinical symptoms of roaring were due to partial paralysis of larynx muscles supplied by the recurrent laryngeal nerves. In some cases, aspiration pneumonia had developed due to paralysis of the pneumogastric nerve. The laryngeal paralysis was probably due to ingestion of lead from soil contaminated by Selby emissions. However, the amount of lead in surface soils exposed to smelter smoke no longer constitutes a hazard and there is no evidence of injury since March 1914.

21760 APTIC NO. 40581

Harkins, W. D. and R. E. Swain

THE CHRONIC ARESENICAL POISONING OF HERBIVOROUS ANIMALS. (PAPERSO ON SMELTER SMOKE, THIRD PAPER). *J. Am. Chem. Soc., 30(6):928-946, June 1908. 16 refs.*

An outbreak of arsenical poisoning occurred among cows, horses, and sheep in the district surrounding Anaconda, Montana, during the year 1902-1903. Operation of the Washoe smelter at Anaconda and autopsies of a large number of animals are discussed. The amounts of arsenic present in the organs of the animals is in many cases small, yet no smaller than might reasonably be expected in chronic arsenical poisoning following the repeated and regular administration of moderate doses of arsenic. In order to see how the results of autopsy would compare with those obtained from animals killed by arsenic, and also to secure data as to the poisonous dose, horses were fed upon arsenic in different forms. The elimination of arsenic probably begins very early and persists during the whole period of its absorption. The proof of posioning is considered. Symptoms of chronic arsenical poisoning include proliferation of the connective tissue cells, degeneration and desquamation of the tubules in the kidneys, congestion or diapedesis, the occurrence of hemorrhagic areas, and occasionally a total disintegration of the cells. Other symptoms are described, as well as the results of an experiment in which sheep were exposed to arsenic trioxide.

21761 APTIC NO. 40610

Harvey, J. M. and W. T. Pentzer

MARKET DISEASE OF GRAPES AND OTHER SMALL FRUITS. *Dept. of Agriculture, Washington, D. C., Agricultural Handbook 189, p. 7, 13-16, 1960.*

Some market diseases of grapes and other small fruits are reviewed. During grape storage, decay caused by species of Alternaria may develop. In plants using a direct expansion refrigeration system, grapes are also sometimes exposed to ammonia gas and change color. Slight discolorations disappear when the fruit is removed from the ammonia atmosphere, but fruit will not recover from severe injury resulting from long exposure. Water or sulfur dioxide may be used to clean or neutralize the atmosphere, but concentrations of SO2 higher than 1% may also cause injury. Gray mold rot is one of the principal causes of spoilage in storage grapes. The symptoms and causal factors are discussed. Vineyard applications of fungicides, fumigation of vinifera grapes with SO2 or sodium bisulfite, precooling, and careful handling can prevent the rot. Hail injury may render fruit more susceptible to attack by decay organisms. Internal browning is not due to decay but is apparently a symptom of physiologic aging. Under experimental conditions, however, the incidence of this defect was greater when grapes received relatively heavy applications of SO2 in storage than when the applications were at a minimum.

21762 APTIC NO. 40104

Hays, G. L., J. D. Burroughs, and R. C. Warner

MICROBIOLOGICAL ASPECTS OF PRESSURE PACKAGE FOODS. II. THE EFFECT OF VARIOUS GASES. *Food Technol. (Chicago), 13(10):567-570, Oct. 1959. 14 refs. (Presented at the Institute of Food Technologists, Annual Meeting, 19th, Philadelphia, Pa., May 20, 1959.)*

Seven food propellants were tested to determine any inhibition effects on the growth of food spoilage organisms: nitrogen, nitrous oxide, carbon dioxide, and four mixtures of N20/CO2 (ratios in percent by volume) 85/15, 75/25, 50/50, and 25/75. Test pressure was 90 psig. Nitrogen did not inhibit growth of any of the test organisms, while A. niger was the only organism tested that did not grow in medium gassed with N2O. Fungi growth was more effectively inhibited by CO2 than was the growth of the bacterial cultures tested. The oxygen content of CO2-pressurized samples had no effect on bacterial growth. The inhibiting concentration of CO2 varied with different organisms, using N20/CO2 mixtures. Since none of the commonly used propellants inhibited all of the test organisms, unrefrigerated pressurized foods will have to be thermally treated in the same manner as conventionally canned foods.

21763 APTIC NO. 40201

Huffman, W. T.

EFFECTS ON LIVESTOCK OF AIR CONTAMINATION CAUSED BY FLUORIDE FUMES. *Interdepartmental Committee on Air Pollution, Washington, D. C., Air Pollut., Proc. U. S. Tech. Conf., Washington, D. C., 1950, p. 59-63. 16 refs. (May 3-5, Louis C. McCabe, ed.)*

Chronic fluorine toxicosis in livestock can be caused by aerial contamination of forage with fluorine effluents from nearby industry, principally phosphate and aluminum processing plants, although cement plants and enameling works may also be involved. The extent of the area involved is governed by the volume of fluoride effluents, the form in which they occur, and meteorologic factors. Effects on livestock depend on the level of intake, duration of the feeding period, the class of animals involved, and feeding and management practices. The symptomatology is described; dental fluorosis and bone lesions are prominent. Normal and threshold levels of fluorine in bone tissue and normal and excess urinary levels are noted. Dairy cattle appear more susceptible to fluorosis than beef breeds, but neither meat nor milk from affected animals is likely to be injurious. Complicating factors unrelated to fluorosis should be considered, since most of the symptoms may be present in a variety of diseases. Disease control requires reduction of emissions to the point where nearby forage contains a safe level of fluoride.

21764 APTIC NO. 40728

John, Matt K., Hong H. Chuah, and Cornelis J. VanLaerhoven

CADMIUM CONTAMINATION OF SOIL AND ITS UPTAKE BY OATS. *Environ. Sci. Technol., 6(6):555-557, June 1972. 15 refs.*

The extent of cadmium contamination of soils in the Lower Fraser Valley, British Columbia, was evaluated. Nitric acid-soluble cadmium in the surface samples among 33 agricultural soils averaged 0.88 ppm. However, nitric acid-soluble cadmium reached as high as 95 ppm in a surface sample taken near a battery smelter, but this level decreased considerably with distance and depth. The effect of soil application of carbonate, nitrate, chloride, sulfate, and phosphate salts of calcium on cadmium uptake by oats was determined in a growth chamber study involving soils taken near a battery smelter and from farmland. Oats grown on the contaminated soils contained very high amounts of cadmium in the roots, with smaller amounts in the above-ground portions. Soil treatments affected the cadmium content of roots significantly but did not affect the cadmium content of tops. (Author abstract modified)

21765 APTIC NO. 40167

Kadota, M., H. Yamada, and K. Ohta

OZONE INJURY TO SOME PLANTS. *(Ozon sesshoku jikken kara mita sushu no shokubutsu no taisei no sai). Text in Japanese. Taiki Osen Kenkyu (J. Japan Soc. Air Pollution), 6(1):141, 1971. (Presented at the National Council Meeting of Air Pollution Studies, 12th, Nagoya, Japan, Oct. 27-29, 1971.)*

Eighteen plants were subjected to tests of their resistances to ozone in a laboratory. The ozone was generated by a small generator, and air was introduced to keep a constant concentration at 0.2 ppm in the contact room. The contact of the plants and ozone-containing gas was performed at a maximum of 5-6 hr/day during the hours of 9:00 in the morning to 16:00 in the afternoon. The formation of initial smoke spots on the tested plants were checked every 30 min during the course of experiment. If an initial smoke spot was found, the plant was removed from the contact room and the degree of injury was investigated after 1-2 hr. Results showed that herbaceous plants had the weakest resistance, deciduous plants had more resistance, and evergreen broad-leaved plants had the strongest resistance.

21766 APTIC NO. 40024

Knuechel, F.

REDUCTION OF THE VALUE OF DRINKING MILK THROUGH TETRAETHYL LEAD? (Wertminderung der Trinkmilch durch Bleitetraaethyl?). Text in German. Med. Welt (Stuttgart), 23(19):737, 1972.

Tetraethyl lead Pb(C2H5)4 is a liquid which evaporates at about 200 C. Together with ethyl bromide, ethyl dichloride, it is added in concentrations of 0.01 to 0.1% to gasolines as an anti-knocking agent. Combustion produces mostly PbCl2 and PbBr2 which are found in the exhaust gas together with some unburned tetraethyl lead. Depending on the traffic density, the lead content of the air and street dust may rise considerably. In Basel, Switzerland concentrations of 5 to 7 micron/cu m were measured in 1956 vs. 2 to 4 micron in a rural village. A considerably higher lead intake of cattle grazing near highways or streets is feasible. Since lead is mainly discharged through urine and feces and only to a very minor extent through the milk, the human intake of toxic concentrations of lead through drinking milk is improbable.

21767 APTIC NO. 40424

Kobak, K. I.

STUDYING THE CARBON DIOXIDE CURRENTS IN THE ATMOSPHERE AS A PARAMETER OF VEGETAL GROWTH. *(Issledovaniye potokov uglekisloty kak pokazateley rastitelnogo soobshchestva). Text in Russian. Tr. Gl. Geofiz. Observ. (Leningrad), no. 263:115-118, 1970. 4 refs.*

The carbon dioxide concentration profile is determined by the radiation level, the vegetation index, and the coefficient of the turbulent transfer. High vegetation indices result in increased concentration differences on different levels under 0conditions of homogenous radiation and a slight degree of turbulence. However, increases in the turbulence coefficient lead to reduced differentiation, and the concentration variations in dense vegetations are enhanced by intensified radiation. The minimum of the absolute concentrations can be observed in the afternoon hours on the level of maximum assimilating surface. The minimum CO2 concentration shows typical daily variation. The isopleth density of the CO2 concentration increases with reduced turbulent transfer coefficient. The major part of (53-89%) of the CO2 is absorbed by the portion of the vegetation which possesses the maximum of assimilating surface. The total CO2 current corresponds to the net productivity, while the gross productivity is the sum of the former and the proportion which is used up for respiration during daytime. The vegetal growth is most economical during the period of intensive growth, where the major part of the CO2 assimilated is accumulated in the form of organic matter, while the net productivity corresponds to 60-70% of the gross productivity, and about 80% of the total CO2. As growth slows down, the proportion used up for respiration increases to reach some 50% of the gross productivity. The ratio of the gross to the net productivity in corresponding vegetation in different geographic zones is largely the same, while the respiration loss is less in northern than in southern regions.

21768 APTIC NO. 40706

Komai, Y.

ZINC ACCUMULATION IN SOILS AND PLANTS DUE TO AIR POLLUTION IN OSAKA PREFECTURE. *(Taiki osen ni yoru tojo oyobi shokubutsu no aen shuseki. - Osaka-fu ni okeru chosa). Text in Japanese. Taiki Osen Kenkyu (J. Japan Soc. Air Pollution), 6(1):158, 1971. (Presented at the National Council Meeting of Air Pollution Studies, 12th, Nagoya, Japan, Oct. 27-29, 1971.)*

The results of survey on zinc accumulations in soil and plants due to air pollution in southern Osaka Prefecture were reported. The quantitative analysis of zinc was by the atomic absorption and x-ray phosphorescence methods. Zinc content in 22 samples of soybean leaves collected from a farm in Saka city had an average of 300 ppm. The value was approximately five times that in other farms with the same sample of seeds. The averaged total zinc content in the soil of this farm was 170 ppm, of which about 10 to 60% was soluble in 0.1 N hydrochloric acid. This was responsible for the high zinc content in the soybean leaves. More zinc was found in bean plants compared to other plants, and the changes of zinc content in vegetables and soil were larger than the changes of other metal content.

21769 APTIC NO. 40209

Lagerwerff, J. V. and A. W. Specht

OCCURRENCE OF ENVIRONMENTAL CADMIUM AND ZINC, AND THEIR UPTAKE BY PLANTS. *Missouri Univ., Columbia, Proc. Missouri Univ. Fourth Annu. Conf. Trace Substances Environmental Health, Columbia, Mo., 1970, p. 85-93. 18 refs. (June 23-25, 1970.)*

Cadmium occurs in air and water as the result of a number of identifiable processes and practices, mainly industrial and agricultural. The metal reaches soil and plant cover directly or indirectly as a result of these activities, a number of which are discussed. Cadmium thus enters the food cycle absorbed by the foliage or the roots of plants. Data indicate the presence of Cd in many common foods. The presence of Cd is usually linked to that of zinc. Soil samples were collected next to two heavily travelled roads. Analysis showed that Cd and Zn concentrations in soil and vegetation decreased with distance from the road, indicating their relation to traffic (motor oil and tread wear from tires). However, high concentrations of one metal do not always entail high levels of the other. The uptake of Cd and Zn by bromegrass as a function of soil concentration, soil ph, and air quality was studied and, using radish, the importance of atmospheric cadmium was weighed against cadmium from soil as a source of contamination. The feasibility of minimizing the uptake and translocation of cadmium by means of zinc or calcium was examined.

21770 APTIC NO. 40115

Marchesani, Vincent J.

A STUDY OF THE EFFECT OF AIR POLLUTION ON FUNGUS. *Atmos. Environ., 3(6):685, Nov. 1969. 3 refs.*

The fact that air pollution appears to cause an inhibition in plant and fungal growth is of major significance because under controlled conditions the amount of dry weight fungal growth should be related to the amount of air pollution in the atmosphere. Four pairs of glass tubes equally spaced in a manifold arrangement contained at the end of each tube a filter, a manometer, and an impinger. Each pair of the four pairs of impingers was used as a separate experiment involving a control and an experimental sample. The filter on the control side of the manifold was packed with activated charcoal and glass wool, and Othe filter on the experimental side of the manifold was packed with only glass wool. Each experimental pair of impingers containing a nutrient solution was inoculated with a different type of fungus. An hourly average of the pollutants measured by the Philadelphia Continuous Air Monitoring Program were received and correlated with differences in growth, on a dry weight basis, between the controls and experimental samples. One experiment demonstrated definite growth differences which could be correlated with high levels of nitric oxide.

21771 APTIC NO. 40940

Martin, S. W. and R. A. Willoughby

EFFECT OF SULFUR DIOXIDE ON THE RESPIRATORY TRACT OF SWINE. *J. Am. Vet. Med. Assoc., 159(11):1518-1522, Dec. 1971. 25 refs.*

Six one-week-old specific-pathogen-free pigs were continuously exposed to approximately 35 ppm sulfur dioxide for a period of 1-6 weeks. Six similar pigs were housed in a control chamber. Clinical changes in the exposed pigs were increased salivation and signs of eye and nose irritation. Histologic changes in the epithelium of the upper respiratory tract included loss of cilia, disappearance of goblet cells, and varying degrees of metaplasia of the tracheal and turbinate epithelium. The hyperpnea and forced expiratory dyspnea previously reported in pigs exposed to SO2 were not observed. The lungs of the exposed pigs were normal. (Author summary modified)

21772 APTIC NO. 40152

Matsuoka Y., T. Takasaki, and O. Udagawa

PRESUMPTION OF THE RELATIONSHIP OF CROP PLANTS INJURY TO AIR-BORNE OXIDANTS IN CHIBA PREFECTURE. *(Chiba ken ni okeru hosakubutsu ijo to okishidanto rui no kankei ni tsuite no suisoku). Text in Japanese. Taiki Osen Kenkyu (J. Japan Soc. Air Pollution), 6(1):140, 1971. (Presented at the National Council Meeting of Air Pollution Studies, 12th, Nagoya, Japan, Oct. 27-29, 1971.)*

The effects of air pollution on the plants and vegetables in Chiba Prefecture were investigated. The injuries on Welsh onion, taro, leek, and corn were remarkable. Pollution also caused the falling of leaves from zelkova trees. The symptoms of all the harvests were different from those of any previous plant diseases. The symptoms were also different from those due to over-humidified, over-dried, or abnormal temperature conditions. The weather conditions one to two days before the injuries occurred were always accompanied by breezes, and the concentrations of sulfur dioxide and oxidants in air were high. The symptoms of one plant were the same as those reported in the U.S.A., believed to be due to oxidants, especially ozone, in air. The injuries were due to the oxidants which contained chiefly ozone.

21773 APTIC NO. 40472

Neustein, S. A., and N. P. Danby

POTENTIAL ATMOSPHERIC POLLUTION FROM THE INVERGORDON INDUSTRIAL COMPLEX. *Scot. Forest., vol. 24:270-273, Nov. 1971. 5 refs.*

The main atmospheric pollutants from the Invergordon complex will be fluorine and hydrogen fluoride from the aluminum smelter and sulfur dioxide and hydrocarbons from the oil refinery. Both acute and chronic tree damage is expected. The effects of F and SO2 on the trees via the soil is expected to be insignificant. Acute tree damage results from high concentrations of pollutants as a result of meteorological conditions or industrial cleansing failure. Chronic tree damage results from long term low level pollution. Broad leaved trees are not regarded as susceptible to chronic pollution. All the conifers are susceptible. Clean air sampling has begun in order to provide before and after comparison. Foliage samples will be taken for a radius of 16,000 M. A survey of lichens has been completed. Lichenology may assist in discrimination between F and SO2 injuries.

21774 APTIC NO. 40609

Ryall, A. L. and J. M. Harvey

THE COLD STORAGE OF VINIFERA TABLE GRAPES. FUMIGATION WITH SULFUR DIOXIDE. *Dept. of Agriculture, Washington, D. C., Agricultural Handbook 159, p. 31-37, 1959.*

The fumigation of fresh grapes in storage to control grey mold rot and the spread of decay is reviewed with respect to methods of applying SO2, i.e., via liquefied gas or sodium or potassium bisulfite; symptoms of SO2 injury in fumigated grapes; factors affecting SO2 injury; and hazards during use to human health, other produce, and equipment. The most common symptoms of SO2 injury to grapes are bleaching or discoloration. The amount of SO2 injury that develops in fumigated grapes is directly related to the amount of fumigant absorbed by the fruit, which is in turn dependent on the grape variety, fruit maturity, temperature, the presence of wounds, and the concentration, frequency, and length of exposure to the gas. Measures to minimize the toxic danger of SO2 to humans exposed to the gas under working conditions and to afford protection from corrosion are discussed.

21775 *APTIC NO. 40166*

Sawada, T., G. Mori, I. Nouchi, T. Odaira, and T. Komeiji

INJURY BY PHOTOCHEMICAL SMOG, AS OBSERVED AND REFLECTED ON PLANTS IN TOKYO. (Kokagaku sumogu no eikyo to omowareru shokubutsu no higai jokyo ni tsuite). Text in Japanese. Taiki Osen Kenkyu (J. Japan Soc. Air Pollution), 6(1):139, 1971. (Presented at the National Meeting of Air Pollution Studies, 12th, Nagoya, Japan, Oct. 27-29, 1971.)

The injuries of plants in Tokyo due to high concentrations of oxidants in the air were investigated. Green leaves of zelkova trees fell with part of them showing chlorosis and necrosis. Some of the leaves also showed dehydration and loss of softness. Welsh onions showed discoloration of the leaves to a grayish-green, and then they turned to gray after two to three days. At even higher oxidant concentration, the leaves drooped remarkably. Spot discoloration of chlorophyll on leaves of many vegetables was also found. The symptoms of both the zelkova tree and the vegetables occurred more often during the period from June to September. However, there were differences between the resistances of the vegetables to the photochemical smog.

21776 APTIC NO. 39932

Schmitz-Dumont, W.

TESTS ON THE EFFECTS OF ATMOSPHERIC HYDROFLUORIC ACID ON PLANTS. *(Versuche ueber die Einwirkung von Fluorwasserstoff in der Atmosphaere auf Pflanzen). Text in German. Tharandter Forstl. Jahr., vol. 46:50-57., 1896.*

Smokebox tests were carried out on 3-year-old trees to investigate the effects of hydrofluoric acid introduced in the form of NaHF in two different concentrations. Smoke was applied once a day. At a concentration of 1:10,000, spruce showed a much lower resistance than oak, the most resistant, and Norway maple. Ashes from oak leaves treated with hydrofluoric acid gas outdoors contained 0.125% fluor while those from untreated leaves were free of fluor. Applications of smoke with hydrofluoric acid in a concentration of 1:300,000 revealed the harmfulness of this substance to plants, even in this low concentration, when the exposure is for a period. Oak and Norway maple again showed higher resistance than spruce case. Brown and red discoloration of the leaves and needles are the most conspicuous symptoms of fluorine damage.

21777 APTIC NO. 39986

Schneider, R. E. and D. C. MacLean

RELATIVE SUSCEPTIBILITY OF SEVEN GRAIN SORGHUM HYBRIDS TO HYDROGEN FLUORIDE. *Contrib. Boyce Thompson Inst., vol. 24:241- 243, 1970. 4 refs.*

The relative susceptibility to gaseous hydrogen fluoride of seven grain sorghum hybrids of commercial importance in Texas was investigated. Fumigation resulted in necrosis of the leaf tips and chlorotic mottle of subtending tissue. Necrosis was generally limited to the second and third youngest leaves. The severity of injury was variable. DeKalb C44C and RS 608 were most resistant to HF-induced necrosis and Northrup King 222A, Pioneer 846, RS 610, RS 625, and RS 671 were more susceptible. There was no relationship between foliar injury and F accumulation. (Author abstract modified)

21778 APTIC NO. 40460

Schnetzer, H. -L. and Wenger, H.

VEGETATION TESTS AND ANALYTICAL WORK IN THE LABORATORIES. *(Vegetationsversuche und analytische Arbeit in den Laboratorien). Text in German. Chem. Rundschau (Solothurn), 25(15):425-427, April 1972.*

Since the important quantities of refuse from mass-stock farming and the various types of sludges are reused in Swiss agriculture, vegetation tests were carried out by the Swiss center for agricultural chemics in order to examine the compatibility of the matter used as manure. Vegetation tests were also done to investigate the influence of exhaust gases from motor cars, fluoride, and sulfur trioxide on plants. The Swiss research center used an air-conditioned vegetation hall where the tests were made during the whole year. The necessary sun light was simulated by fluorescent strip lamps of 20,000 Lux. Plants to be tested were put into special zinc pots filled with 5 l of mineral soil and were exposed.

21779 APTIC NO. 39887

Sertz, H.

ON THE EFFECTS OF HYDROFLUORIC ACID AND FLUOSILICATE ON LIVING PLANTS. *(Ueber die Wirkung von Fluorwasserstoff und Fluorsilizium auf die lebende Pflanze). Text in German. Tharandter Forstl. Jahrb., vol 72:1-13, 1921.*

Smokebox tests were carried out on fir and spruce trees to investigate the effects of hydrofluoric acid and fluosilicate in two different concentrations. Both types of trees showed signs of acute poisoning from tests where smoke with a concentration of 1:10,000 of either compound was applied for 1 hr each day. In another test, where the trees were treated with a concentration of 1:250,000 of either compound for three 1-hr periods per day to indicate chronic effects, firs showed higher resistance to fluor than did spruces. Hydrofluoric acid and fluosilicate are extremely harmful to living plants even in very low concentrations. Damage symptoms are similar to those observed in sulfurous acid tests. The material damaged by smoke was analyzed for fluor content.

21780 APTIC NO. 40590

Shaw, Charles F. and E. E. Free

AGRONOMIC AND SOIL CONDITIONS IN THE SELBY SMOKE ZONE. *Bull. Bureau Mines, no. 98:451-473, 503-520, 1915. 86 refs.*

Maximum amounts of lead and arsenic found in soil samples from the Selby smoke zone were far too small to have any injurious effect on plants grown in the soils. Indeed, much larger amounts than those actually found would not affect the agriculture of the region. The poor agricultural conditions prevailing are amply accounted for by the naturally unfavorable soil and the extremely poor agricultural practices of the region.

21781 APTIC NO. 39923

Stas, M. E.

FLUORIDE POSIONING DUE TO EXHAUST GASES AND DEPOSITS FROM A SUPERPHOSPHATE FACTORY. *(Fluoor-vergiftiging door rookgassen en stof van een superphosphaatfabriek). Text in Dutch. Chem. Weekblad, no. 38:585-593, 1941. 101 refs.*

Fluoride poisoning of cows, caused by emissions from a superphosphate factory, was investigated. Fluoride levels in bones were determined by quantitative methods, and the fluoride contents of rain and sluice water were measured. A method of sample preparation is described, and measured values of bone ash from different cities are tabulated. Results indicate that the affected animals were exposed to soluble fluoride in sluice water and to large quantities of fluoride in gases and hay fodder. Fluoride poisoning in humans, experiments on damaging effects to plants and animals, and problems of quantitative determination are discussed, and a literature survey of fluoride toxicity in cows is included.

21782 APTIC NO. 39882

Tallis, J. H.

LICHENS AND ATMOSPHERIC POLLUTION. *Advan. Sci. 21(91):250-252, Sept. 1964. 5 refs.*

The sensitiviey of foliose and fruticose lichens to sulfur dioxide, and their absence in industiral areas of England and Sweden, suggest that the distribution of lichens might be used to determine the limits within which atmospheric pollution is operating. In south Lancashire, grassland yield and persistence have been markedly affected by 0.1 ppm SO2. Lichen growth here is very scanty. The critical level for growth of many foliose lichens appears to be 0.05-0.08 ppm SO2.

21783 APTIC NO. 40001

Tanaka, Hirofumi, Toshiharu Takanashi, and Michihiko Yatazawa

EXPERIMENTAL STUDIES ON SULFUR DIOXIDE INJURIES IN HIGHER PLANTS. *Water, Air, Soil Pollut., 1(2):205-211, April 1972. 10 refs.*

Reversible decrease in carbon dioxide fixation has been reported in rice plants exposed to low conentrations of sulfur dioxide. Alpha hydroxy sulfonate is thought to form in leaves by an addition-reaction between plant aldehyde and SO2, and to inhibit the process of the photosynthesis. Radiochemical experiments were conducted to examine the occurrence of glyoxylate bisulfite alpha hydroxy sulfonate forms of glyoxylic acid found in rice plant leaves exposed to radioactive sulfur dioxide. In plants exposed to SO2, sufficient amounts of glyoxylate bisulfite (10 to the minus 9th M/gram of fresh leaves) could be formed and thereby inhibit the progress of the path from glicolic to glyoxylic acid. The results strongly suggest that the formation of sulfite additives of aldehyde in plants exposed to SO2 and its inhibitory effect would assume a mechanism which account for the decrease in photosynthesis. (Author abstract modified)

21784 APTIC NO. 40530

Taoda, Hiroshi

THE EFFECTS OF THE URBAN ENVIRONMENT ON BRYOPHYTES AND LICHENS. *(Toshi Kankyo to sentai, chii-rui). Text in Japanese. Baioteku (Biotech)., 3(1):13-17, Jan. 1972. 16 refs.*

For more than 100 years, bryophytes and lichens have been studied as indices for the atmosphere. The dryness of the air, toxic gas, dust, and the pH index have direct influences on the growth of plants, and bryophytes and lichens are the best indicators of such conditions. In urban areas, the humidity of the air is low, the soil is impervious, nitrate and lime supplies are greater than rural areas, and there is an abundance of concrete buildings. These conditions work on special types of bryophytes, bark epiphytes, and lichens. Lichens are particularly good indicators of air pollution because they depend exclusively on rain water for nourishment and life, and water is directly absorbed from the entire body; therefore, pollutants are proportionately absorbed; the speed of growth is slower than in higher plants, and the recovery from damages takes longer; they are perennial evergreens and receive the effect of pollution through the year. The growth pattern of adhesive bryophytes in Metropolitan Tokyo was investigated and a map was made. There was a clear sign that the number of species increased from the center of Tokyo toward suburban areas. The chemical reactions of sulfur dioxide on bryophytes and liches are explained.

21785 APTIC NO. 40585

Wells, A. E.

FUMIGATION EXPERIMENTS TO DETERMINE THE EFFECT OF HIGHLY DILUTED SULPHUR DIOXIDE ON A GROWING GRAIN CROP. *Bull. Bureau Mines, no. 98:213-307,503-520, 1915. 86 refs.*

Following complaints of damage to crops and orchards within the Selby smoke zone, experiments were undertaken to determine the visible injury to growing barley plants brought about by fumigation with definite concentrations of sulfur dioxide and for definite times; the effect of visible injury on crop yield; and the possibility of invisible injury. A continuous 3-hour fumigation with 3 ppm, or more, of SO2 caused visible bleaching on barley plants in Vallejo and Davis when plants were less than 15 cm high. Injury was great at 5 ppm SO2, more than 2/3 of the foliage was bleached. The injury produced was principally the concentrated or kill-back type. Severe bleaching was also caused by long-time fumigations with as little as 1 ppm SO2. The bleach developed most rapidly in the sunlight. Repeated five-minute fumigations with 3-5 ppm SO2 markedly reduced grain yield. Yields were lower following 186 5-minute fumigations with 4 and 5 ppm SO2 than following 90 10-minute fumigations at the same concentrations. Plants fumigated with 1 or 2 ppm SO2 did not show reduced yield.

21786 APTIC NO. 40744

Yagi, Tatsuhiko

ENZYMIC OXIDATION OF CARBON MONOXIDE. II. *J. Biochem., 46(7):949- 955, 1959. 17 refs.*

An enzyme which catalyzes the oxidation of carbon monoxide into carbon dioxide was obtained in a free cell state from the bacteria Desulfovibrio desulfuricans. The enzyme activity was assayed manometrically by measuring the rate of gas uptake under the atmosphere of carbon monoxide in the presence of benzyl-viologen as oxidant. The optimum pH range was 7 to 8. The activity was slightly suppressed by illumination. The enzyme was more stable than hydrogenase or formate dehydrogenase against the heat treatment, suggesting that it is a different enzyme than these. In In the absence of an added oxidant, the enzyme preparation produced hydrogen gas under the atmosphere of carbon monoxide. The phenomenon can be explained assuming the reductive decomposition of water. (Author summary modified)

21787 APTIC NO. 40202

Zimmerman, Percy W.

EFFECTS ON PLANTS OF IMPURITIES ASSOCIATED WITH AIR POLLUTION. *Interdepartmental Committee on Air Pollution, Washington, D. C., Air Pollut., Proc. U. S. Tech. Conf., Washington, D. C., 1950, p. 127-139. 30 refs. (May 3-5, Louis C. McCabe, ed.)*

Studies of the effects of low concentrations (0.1-0.2 ppm) of sulfur dioxide on alfalfa under different conditions of temperature, water, and nutrient supply; sulfur content of nutrients; and age of plants showed that resistance to SO2 at 40 F or below is greater than at higher temperatures. Drying the soil to a point that causes wilting also increases resistance to the gas. Plants tend to recover between treatments if enough time elapses. Plant susceptiblity during treatment increases with light up to full sunlight. Young plants are more resistant than old plants, while middle-aged leaves are most susceptible. The susceptibility of various species and the characteristic symptomatology are described. The results of experimental fumigations of plants with 0.05 to several ppm hydrofluoric acid gas in air are detailed, and similar studies of the effects of chlorine, hydrogen sulfide, ammonia, mercury vapor, ethylene and carbon monoxide, and the vapors of 2,4 dichlorophenoxyacetic acid and other hormone-like herbicides are reported.

21788 APTIC NO. 40368

Zuber, Roberto

NEW TASK FOR THE RESEARCH INSTITUTE: ENVIRONMENTAL HYGIENE. *(Neuer Aufgabenbereich der Forschungsanstalt: Umwelthygiene). Text in German. Chem. Rundschau (Solothurn), 25(16):450, April 1972.*

A new department for environmental hygiene of the Swiss Research Institute for Agricultural Chemistry deals with health aspects of air pollutants on domestic animals with the effects of air pollutants on agricultural crops. The department tests the fodder, plants, fruits, as well as bones, and urine of animals from the vicinity of fluorine emitting industries as to the fluorine concentration. In all cases the method with the ion specific fluoride electrode was found most suitable for the analyses. Measurements of the lead concentration along street and highways by atomic anstorption spectrophotometry revealed that plants and grass carried lead concentrations of up to 170 ppm 1-3 m from the street curb. They decrease slowly to a distance of about 50 m. In some cases lead residues were still measured as far off as 100 to 200 m. The various types of plants accumulate the lead in different ways. Rain and tap water wash out the metal to half of the original concentration. The sulfur dioxide concentration of the air is presently being determined by the Ultragas unit. Measurements of other pollutants such as ammonia, chlorine, the oxides of nitrogen, dust, unburned hydrocarbons, oil, rubber, and asbestos shall be the target of future studies.

EFFECTS-MATERIALS

21789 APTIC NO. 40656

Breedveld, P.

ALUMINUM EXPOSED TO WEATHERING. *(Aluminium, blootgesteld aan atmosferische invloeden). Text in Dutch. TNO-niews, 26(3):189- 192, March 1971.*

Results of weathering tests, carried out over 12 years on unalloyed aluminum and different wrought aluminum alloys (aluminum-maganese, aluminum-magnesium, aluminum-magnesium-silicon, aluminum-copper- magnesium, and aluminum-zinc-magnesium-copper), normally used in the building industry in industrial, marine, and rural atmospheres, are described. Some of the specimens were subjected to surface treatment. The plates 25 by 25 cm, 2 mm thick), exposed southward at an angle of 45 deg, were attacked more on the reverse than on the front side due to the cleaning effect of precipitation. An industrial atmosphere was the most corrosive, followed by marine and rural atmospheres. The weight loss of the plates after 12 years exposure was usually below 1%; copper content in the alloys caused an especially intense attack. Aluminum-magnesium-silicon alloys in an industrial atmosphere lost their toughness in a relatively short time. Rivets and bolts in aluminum plates, made of steel and zinc and cadmium coated steel corroded intensely, particularly in an industrial atmosphere, and aluminum rivets and bolts only proved to be satisfactory. The loss in the mechanical strength was negligible. The corrosion of welds in rural and marine atmospheres was of the same order as that of the aluminum plate. The corrosion of the welds was more intense than that of the plate in an industrial atmosphere, particularly in the case of unalloyed aluminum and aluminum-manganese alloy.

21790 APTIC NO. 39926

Cowherd, Chatten, Jr.

ECONOMIC EFFECTS OF AIR POLLUTION ON MATERIALS. *Missouri Univ., Columbia, Coll. of Engineering and Missouri Air Conservation Commission, Jefferson City, Control Dusts, Smokes, Noxious Odors, Proc. Annu. Air Pollut. Conf., 3rd, Columbia, Mo., 1970, p. C1-C17. 5 refs. (Nov. 17.)*

Results of a recent study are presented indicating that annual economic losses resulting from soiling and deterioration of materials exposed to polluted atmosphere are far greater than the anticipated yearly expenditures for the control of air pollution. U. S. Government estimates for the costs of control (to implement the Air Quality Act) over the next five years total about $7 billion. However, losses amounting to more that $9 billion may be incurred each year due to increased deterioration of materials exposed to air pollution. Soiling damage to materials may be many times greater. While more data are needed to refine these estimates, there is strong evidence that the control of air pollution is desirable from a purely economic standpoint. Data are included for numerous materials on physical and chemical effects of pollution, economic values, and damage by soiling and deterioration. (Author summary modified)

21791 APTIC NO. 40510

Fabian, Robert J. and John A. Vaccari

HOW MATERIALS STAND UP TO CORROSION AND CHEMICAL ATTACK. *Mater. Eng., 73(2):36-59, Feb. 1971.*

A detailed report is presented concerning the resistance of metallic and nonmetallic materials to corrosion and chemical attack. The metals studied include: aluminum, beryllium, cadmium, carbon steels, cast irons, chromium, cobalt, copper, lead, low alloy steels, magnesium, molybdenum, nickel, precious metals, stainless steels, tin, titanium, wrought iron, zinc, and zirconium. The nonmetallic materials include rubber, graphite, nylon, and many synthetic materials. The effects of air, sea water, and fresh water on these materials are reported. The effects of many acids were studied, including: acetic, boric, chromic, citric, fatty, formic, hydrochloric, hydrofluoric, nitric, phosphoric, and sulfuric. Other agents studied for their effects on these materials include: bases and salts; solvents and cleaners; oils, fuels, and petrochemical fluids; and other chemicals, such as ammonia, chlorine, bromine, and sulfur dioxide. There are two shortcomings in the data presented. First, there is a wide disparity in the types of tests used by investigators. Also, there are many exceptions to the general rule that the speed of a chemical reaction increases with increasing temperature. Some materials may reverse the usual pattern as temperature increases or decreases.

21792 APTIC NO. 40432

Fujii, Toru and Chizuko Tsuda

STUDIES ON THE EFFECTS OF AIR POLLUTION ON THE FADING OF DYED FABRICS. (2). *(Senshokubutsu no taishoku ni oyobosu taiki osen no eikyo ni kansuru kenkyu. (2)). Text in Japanese. Taiki Osen Kenkyu (J. Japan Soc. Air Pollution), 6(1):162, 1971. (Presented at the National Council Meeting of Air Pollution Studies, 12th, Nagoya, Japan. Oct. 27-29, 1971.)*

Seven kinds of dyed fabrics with three types of dyes were tested for the effects of air pollutants on their fading. The test fabrics were placed in wooden boxes which allowed only air to pass through. Color was determined by measuring the reflectivity using an automatic spectrophotometer, and expressed with XYZ color table. The pollutants and weather conditions tested were sulfur dioxide, particulates, nitric oxide, nitrogen dioxide, carbon monoxide, temperature, and humidity. Acedic dye received the largest effect from pollutants, whereas dispersed dye was most easily affected by NO2 and direct dye most easily affected by SO2. The dispersed dye was also most easily affected by particulates. The effects of SO2 and particulates on fading was larger than that of NO, NO2, or CO.

21793 APTIC NO. 40704

Huff, H. and F. Schreiber

INFLUENCE OF HOT GAS CORROSION ON THE LIFE OF HIGH TEMPERATURE MATERIALS. *(Zum Einfluss von Heissgaskorrosion auf die Haltbarkeit von Hochtemperaturwerkstoffen). Text in German. Werkstoffe Korrosion, 23(5):370-377, May 1972. 21 refs.*

The influence of hot turbine gas under mechanical stress on the life (creep strength) of three different nickel-base high-temperature gas turbine materials with a chromium content of 9.32-21% was studied. The specimens were exposed to a flow of hot gases formed during the combustion of aviation gasoline, containing compounds of sulfur and chloride, nitrogen, carbon dioxide, oxygen, and vanadium pentoxide. The flow rate was 250 m/sec. A combination of salts present in sea air (sodium chloride, magnesium oxide, calcium chloride, and magnesium sulfate) was added to the hot gas in amounts up to 30 ppm. The damage caused to the alloy was dependent on the compositions of the alloy and the gas, the deposits formed, and the operational parameters. The behavior of the metals was influenced by stress corrosion cracking even in the creep range. The creep strength was reduced within a critical temperature range of 800-1000 C by 20 to 50%, depending on the salt concentration in the gas. The creep strength was largely determined by the local attack due to cracking, while the influence of the general corrosion was negligible. The rate of the local corrosion was increased by a factor of about 10 due to the presence of salt in the gas. The influence of the salt concentration was negligible only below 1 ppm, which means that calculations may be based on creep data obtained in air only below the above level.

21794 APTIC NO. 40646

Luckat, Siegbert

STUDIES FOR THE PROTECTION OF MATERIAL GOODS MADE OF NATURAL STONE AGAINST AIR POLLUTANTS. *(Untersuchungen zum Schutz von Sachguetern aus Naturstein vor Luftverunreinigungen). Text in German. Staub, Reinhaltung Luft, 32(5):217-220, May 1972. 4 refs.*

Natural stone is affected most by the pollutant sulfur dioxide. The destruction mechanism of SO2 is explained on the example of lime sandstone. The sulfur dioxide present in the air is first oxidized to sulfuric acid which reacts with the carbonatic binding substances of the stone to form calcium sulfate. The latter is a lot more water soluble than the carbonate. For protection preservatives must be used. A rapid testing method for the resistance of stones treated with preservatives was developed. The test material is placed into saturated sodium sulfate solution. After the stone is soaked with solution it is dried and placed into the solution again. The process is repeated 10 times. After removal of the remaining solution, the loss of stone substance is determined gravimetrically. The method was tested with five different types of stone and five different preservatives. The agreement of the results obtained with this method with reality is presently being studied in field experiments.

21795 APTIC NO. 40151

Naruse, T., S. Tazawa, and K. Yamazaki

DEVELOPMENT OF A SHORT-TIME CORROSION MONITOR IN ENVIRONMENTS. *(Shinsoku fushokukei no kaihatsu ni tsuite). Text in Japanese. Taiki Osen Kenkyu (J. Japan Soc. of Air Pollution), 6(1):106, 1971. (Presented at the National Council Meeting of Air Pollution Studies, 12th, Nagoya, Japan, Oct. 27-29, 1971.)*

A short-time corrosion monitor was developed. The detection sensitivity on the amount of corrosion was 0.015 micron/scale of the meter, the temperature correction accuracy of the corrosion detecting panel was 1-2% at a temperature under 150 C, and the meter possessed an air-cooling probe which could adjust the surface temperature of the corrosion detecting panel to about 60 C. Since the corrosion of metal in flue gas depends largely on the surface temperature of the metal, it was designed that the surface temperature of the corrosion detecting panel was arbitrarily changeable in order to obtain the corrosive property of the flue gas from the heat-engine plant in a short time. The atmospheric exposure experiment of the corrosion detecting panel was carried out on the roof of the laboratory, and the result showed that there was a relationship between the corrosion and weather, particularly the amount of rain. Experiments were also carried out in the stacks of the heat-engine plant; the results showed that there were differences in anti-corrosive effect for different distances of ammonia injection which was used to prevent corrosion at low temperature and pollution.

21796 APTIC NO. 40650

Rahmel, A.

SCALING OF IRON IN O2-SO2-INERT GAS MIXTURES AT 900 C. *(Die Verzunderung von Eisen in O2-SO2-Inertgas-Gemischen bei 900 C). Text in German. Werkstoffe Korrosion, 23(4):272-278, 1972. 7 refs.*

Kinetic and metallographic investigations into the oxidation of pure iron in oxygen-sulfur dioxide-inert gas mixtures at 900 C showed that SO2 increases the scaling rate when the oxidation in SO2-free gas follows a linear kinetic law. In such cases the transport of oxygen from the flowing medium to the specimen surface is the rate-controlling factor. Such conditions exist at 900 C, with a linear flow rate of 5.8 cm/sec, and with oxygen content below about 7%. The constant of the linear kinetic law is a linear function of the SO2 partial pressure when the oxygen pressure is constant. Under such conditions the reaction of iron with SO2 is controlled by transport phenomena in the gas phase. Since the diffusion of iron ions and electrons through the scale layer is the rate-determining factor at oxygen content above about 7%, the SO2 has practically no influence on the oxidation. Metallographic investigations revealed a mixture of iron sulfide and ferrous oxide, of lamellar structure with perlitic appearance in particular near the metal-scale boundary at low oxygen contents. No iron sulfide is formed any longer and iron oxides appear with the transition from the linear to the parabolic law which is dependent on both the O2 and SO2 content in the gas. An FeO layer 5 to 20 micron in thickness with FeS inclusions is formed at the Fe/scale boundary in mixtures with oxygen content below about 30%. Thus, the assumption can be made that the oxidation rate in the initial stage is still influenced by transport phenomena in the gas phase. No FeS formation could be revealed at oxygen content above about 30%. The results indicate that the initial stage of the oxidation of unalloyed and low-alloy steels above 900 C in the presence of combustion gases with about 1-3% O2 will not follow the parabolic low, and that the transition to the latter will be delayed by increasing temperatures. Thus, the scaling rate will be increased by increased SO2 content in the above temperature range. However, the scaling rate will not be influenced by SO2 at temperatures above about 600 C. When preliminary oxidation above 900 C in SO2-free atmosphere with O2 content below about 5% is applied, the oxide layer of considerable thickness may prevent the formation of sulfide during the subsequent oxidation in sulfur-containing gas.

EFFECTS-ECONOMIC

21797 APTIC NO. 39972

Dept. of Commerce, Washington, D. C., National Industrial Pollution Control Council

PRIVATE INDUSTRY EXPENDITURE. *In: Council Report. Appendix D, p. 39-45, Feb. 1971.*

GPO

No comprehensive and reliable data exist as to the amounts being spent by American industry on pollution control and abatement. Estimates in current use are based on extrapolations from bases of doubtful value. A capital expenditures survey conducted by the National Industrial Conference Board and focused on industries in 17 Standard Industrial Classification categories, indicated that 248 respondents reported investing $238 million, i.e., 3% of their $7.5 billion of capital investment, in 1968 for pollution control and abatement. The same survey projected pollution-related capital expenditures by the same respondents for 1969 at $306 million, or a 27% increase over 1968. In contrast, total capital expenditures for manufacturing industries rose by only 10% from 1968 to 1969. Thus the percentage of pollution-related capital expenditures in manufacturing industries appears to have risen from about 3% in

1968 to 4% in 1969. Private reports of pollution control and abatement expenditures by a number of companies are summarized which indicate a range of individual company actions reflecting size and nature of operations, differences in age and condition of plants, and other variations.

21798 APTIC NO. 40163

THE SWEDISH FOREST INDUSTRY TO INVEST ALMOST 500,000,000 SW. CRS. IN POLLUTION CONTROL OVER A THREE-YEAR PERIOD.

(Svensk skogsindustri redovisar: Miljovardsinvesteringar for 471 milj. kr under trearsperioden 1971-1973). Text in Swedish. Svensk Papperstid. (Stockholm), 75(6):201-206, March 1972.

According to a recent survey, during the 3-year period 1971-73, pulp, paper, and wood fiber mills in Sweden will invest more than 89 million dollars in measures to reduce pollution by the forest industry by installing equipment which will limit and purify the discharges from the mills into water and the atmosphere. Compared with the 3-year period of 1968-1970, when corresponding investments amounted to 34 million dollars, anti-pollution measures have indeed been stepped up substantially. Furthermore, no slackening off after 1973 is expected. On the contrary, it is estimated that the tempo will increase further, so that the total investments in pollution control during the 5-year period 1971-1975 will be 209 million dollars. The annual costs of pollution control in the pulp and paper industry are estimated to have risen to 20 million dollars in 1970, which is the equivalent of more than $1.90/ton of pulp/paper. This constitutes the running, maintenance, and capital costs of the pollution control installations. The figures concerning the forest industry s pollution control activities were compiled on the basis of a survey by the Swedish Pulp and Paper Association of pulp and paper companies. The annual costs of pollution control/produced ton are on the average somewhat higher in the Swedish forest industry than in the USA, and considerably higher than in Canada. The survey contains information from 105 firms regarding new mills, addition and alterations to existing plants, and the installation of machinery and equipment carried out mainly for the purpose of eliminating discharges from the production processes. The survey also covered the costs of research and development work in the pollution control sector. In the majority of cases, the investments are combined with an expansion and modernization of the productive machinery and only the legitimate portion of the costs, representing the pollution control measures proper, is given. The overall picture is that about 13% of 89 million dollars are spent on anti-air pollution measures, 55% on internal measures in the mill, 30% on the treatment of waste water before it reaches the receiver, and 4% on research, surveys and checks. The average annual investments in pollution control between 1971 and 1973 of 30 million dollars may be compared with the pulp and paper industry s total investment costs, which in recent years have amounted to 190 million dollars/year. This means that the efforts to improve the environment near the mills have now risen to about 15% of the total investments excluding maintenance and repairs. (Author abstract modified)

21799 APTIC NO. 40198

CHARTS TRENDS IN POLLUTION CONTROL.

Foundry, 97(4):137, 140, 142, 144, April 1969.

Costs and applications of various systems for air pollution control in foundries are reviewed on the basis of a recently published study of the air pollution control equipment market. The cupola, which is used in more than 90% of all gray iron foundries, can produce less expensive castings than electric arc or induction furnaces. However, induction furnaces do not require expensive abatement equipment and therefore the price advantage now enjoyed by cupolas will diminish gradually as emission laws become stricter. Venturi scrubbers employing high pressure drops provide efficient and economical control of foundry emissions. The fabric filter works most effectively where efficiencies of 99% or more are required, temperatures are below 400 F, gas and particulate matter are dry and noncorrosive, and a pressure drop of an inch or two of water is tolerable; however, this is the most expensive type of equipment. Wet scrubbers are used extensively on cupolas and generally comprise the largest part of the total plant investment. Because of its low cost, the mechanical collectors are frequently teamed with other more expensive and efficient collection systems to reduce their load.

21800 APTIC NO. 40249

IT COSTS MORE TO RUN A CLEAN CHEMICAL PLANT.

Chem. Week, 109(10):31-33, Sept. 8, 1971.

Pollution control spending was examined as part of a broadening series of inquiries into pollution control attitudes and postures in the process industries. Of 23 major chemical companies queried, 14 gave details of their pollution control activities the most complete data yet on what chemical companies have spent and plan to spend. Generally, the pollution spending pace was accelerating more rapidly than expected, with the rate of expenditure expected to further increase as the standards tighten toward zero pollutants and increasingly expensive control equipment is needed. The toughest problem companies face is to meet today s standards while keeping an eye on the eventual goals of state and federal control programs. Most of the present expenditures are for older plants. The cost of pollution control in newer plants is often absorbed in the cost of making process modifications. Control of liquid effluents generally takes the major share of spending, although for some companies, controlling air pollution is the major cost. Disposal of solid wastes continues to consume the smallest share of the chemical industry s pollution control dollar. Aside from rapidly rising capital outlays, control equipment is adding to operating costs, which are now running 20-80% of capital costs.

21801 APTIC NO. 40545

Commins (J. A.) and Associates, Inc., Fort Washington, Pa.

A LOCALIZED STUDY OF GRAY IRON FOUNDRIES TO DETERMINE BUSINESS AND TECHNICAL COMMONALITIES CONDUCIVE TO REDUCING ABATEMENT COSTS.

Office of Air Programs Contract OAP-EPA 68-04-0043, Rept. APTD- 1081, 177p., Jan. 1972. 45 refs.

NTIS: PB 209291

The extent of technical and business commonalities in gray iron foundries which would be conducive to reducing air pollution abatement costs was examined on the thesis that economics of scale both in purchase and in financing costs might be available to members of the group, thereby lessening the financial impact to small foundries in complying with air pollution regulations. A sizeable portion of an air pollution control system can be substantially identical for foundries in Pennsylvania having commonalities of melt rate, blast rate, and stack exit temperatures. Installation problems are unique and are not amenable to the economies of scale. In some cases, process changes are an attractive alternative to control devices. A group of ten foundries of ten ton/hr melt rate could save $20,000 per each group member by group procurement. If group financing turns out to be possible, a group of ten foundries could save $15,000 for each member s financing charge. No precedent exists for this type of joint venture thus seriously inhibiting the adoption of groups with the goal of obtaining the savings previously mentioned. This problem can be overcome by conducting a program in gradual steps. As the program proceeds, previously unanswered questions are answered and the risk is eliminated or at least quantified and accepted, the parties would become more increasingly committed up to the last phase of firm commitment in a legally binding way. (Author conclusions modified)

21802 APTIC NO. 40546

Kellogg (M. W.) Co., Piscataway, N. J., Research and Engineering Development

ECONOMIC EVALUATION OF METAL OXIDE PROCESSES FOR SO2 REMOVAL FROM POWER PLANT FLUE GASES. PHASE 3. (FINAL REPORT). COST SENSITIVIT STUDY OF MAJOR PROCESS PARAMETERS. *National Air Pollution Control Administration Contract PH 86-68-86, Rept. APTD-0689, RED-70-1237, 198p., March 31, 1970.*

NTIS: PB 200882

A cost sensitivity study to determine the effects of major process parameters on plant investment and operating costs of dry regenerable sulfur dioxide removal processes using a minimum of experimental data is examined. The scope is limited to processes treating gases greater than 300 F, and containing low concentrations of sulfur oxides, e.g., power plant flue gases. Base costs are for alkalized alumina but many of the process parameters were expanded to include other solid sorbents. All processes designed to remove SO2 will increase the cost of power generation. Selection of the best process for any particular location will require a comparison of all the processes available. An SOx-removal plant sized to treat one-half of the power plant flue gases shows the lowest cost and will add about $2.50/T to the coal cost. The cost of sulfur produced is greater than the expected selling price. The most economical operation is one which uses the lowest sulfur coal available at regular prices. The requirements for a high quality sorbent are low attrition rate and high sorption capacity. Development work should be directed toward lowest attrition if both requirements cannot be met. The regeneration temperature should be as low as practical to keep costs down. (Author conclusions modified)

21803 APTIC NO. 40663

THE ECONOMIC SOLUTION - POLLUTER RESPONSIBILITY PRINCIPLE. *(Die wirtschaftspolitische Losesung: Verursacherprinzip). Text in German. Umwelt (Duesseldorf), 2(2):27-33, April 1972. 5 refs.*

The developments which took place up till now with regard to environmental pollution have caused serious damages to the political economy. Since our economic system is based on the principle of self-control through market and competition and receives its essential impulse through private initiative, economic measures to control environmental pollution undertaken by the Government should not restrict the market more than necessary. In the case of big industries polluting the environment, the most effective measure seems to be the introduction of a fee to be paid by the polluter corresponding to the additional social costs which would be caused by the emission of the respective harmful substance. Additional social costs are costs developing for the political economy from environment damages owing to the activity of private enterprises. This type of calculation takes the self-cleaning capacity of the environment into account. Thus, the private enterprise may choose whether it is more economical to avoid the environmental pollution or whether it is cheaper to pay the fee. The fee should depend on the type and quantity of the polluting substances in order to give private initiative an impulse to modify production processes to avoid environmental pollution. In case of the large quantity of small polluters like households and rural enterprises, it is impossible to make the polluter pay directly for harmful effects on the environment. In this case the producer of harmful substances will have to pay the fee; the costs in the end will be paid by the consumer who is the polluter. For example, the mineral oil industry will have to pay the fee because of the sulfuric substances in the fuel. Of course in special cases governmental directions and restrictions cannot be avoided.

21804 APTIC NO. 39948

Alexander, W. H. and R. L. Bradley

CAN YOU JUSTIFY A CO BOILER? Petrol. Refiner, 37(8):107-112, Aug. 1958. 2 refs. (Presented at the Western Petroleum Refiners Association, El Paso, Tex., May 22, 1958.)

A carbon monoxide boiler is one of the most economical and least troublesome means for recovering heat from catalytic cracking unit flue gas streams. It produces steam for refinery use and can eliminate or materially reduce the emission of air pollutants. The costs of a CO boiler and conventional unit are compared assuming that additional steam facilities are required, and the economics for determining a range of catalytic cracking unit sizes which can pay out a CO boiler are analyzed. The basic variables in this analysis, in decreasing order of importance, are coke burning rate, fuel value, CO2/CO ratio, flue gas temperature, excess oxygen in CO gas, and hydrogen content of regenerator coke. Generalized payout curves are given as a function of coke burning rate. In some areas, reductions in noxious fumes may be sufficiently important to justify an extended payout period.

21805 APTIC NO. 39941

Alspaugh, M. L., W. M. Hager, and G. H. Unzelman

THE IMPACT OF PROPOSED LEAD ANTIKNOCK RESTRICTIONS ON THE NATURAL GAS PROCESSOR. *Natural Gas Processors Assoc., Tulsa, Okla., Proc. Nat. Gas Process. Assoc., Annu. Conv., 50th, Houston, Tex., 1971, p. 138-147. 1 ref. (March 17-19.)*

The effect of proposed lead antiknock restrictions on the natural gas processor was evaluated by applying linear-programming (LP) models to three refining situations: a natural gas processor who manufactures finished motor fuel; a composite Gulf Coast refinery; and a representative mid-continent refinery. The three situations show the direct effect on the natural gas processor who manufactures motor fuel and the effects on the two areas of the U. S. where the majority of natural gasoline is absorbed by the refining industry. Results obtained from various cases run with the three LP models for current operations and several possible future situations are reviewed in detail. Natural gasoline, particularly the C5-C6 hydrocarbons, would have little value in the manufacture of finished motor fuel using presently available processing techniques; and the petroleum refiner would resort to more severe processing to maintain octane quality and, in so doing, would make more light hydrocarbons.

21806 APTIC NO. 40557

Daily, James W.

GASOLINE MODIFICATIONS. A COST EFFECTIVENESS ANALYSIS. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 6p., 1970. 3 refs. (Presented at the Air Pollution Control Association, West Coast Section, Technical Meeting, 5th, San Francisco, Calif., Oct. 8-9, 1970.)*

The effect of reducing the front end volatility of gasoline and removing butenes and pentenes from the gasoline by conversion to other organics, on the evaporative loss from gasoline-associated sources was considered. The reactive emissions were calculated for the years 1968, 1972, and 1985 for Los Angeles County. In order to estimate the average emission of reactive tons/day without extensive calculation, it was assumed that the change in emission rate in each case was a straight line function. The date points for 1968, 1972, and 1985 were plotted and the average of the 10-year period 1970 through 1979 was interpolated from these graphs. The cost effectiveness index for reducing front end volatility was $2.64 reactive ton/day/vehicle and $2.71 reactive ton/day/vehicle for replacing C4-C5 ofefins.

EFFECTS-ECONOMIC

APTIC NO. 39925

21807

Hoerich, H.

COST COMPARISON BETWEEN FILTER FABRIC SEPARATORS. *(Kostenvergleigh von Gewebeabscheidern). Text in German. Luft Kaeltetech., no. 4:194-196, 1969. 5 refs.*

Cost of four different types of filter fabric separators (Multiflux filter, chamber type separators, standard round filters and vibro-filters) were compared to determine a type with optimum expenses for future investments. In the comparison, based on a capacity of 10,500 cu m/hr, write-off, repair and maintenance costs, tissue and energy costs as well as the number of actual running hours were taken into account. The operating costs were highest for the Multiflux filter due to its high price and high energy costs, while vibro-filters were the least expensive of all types. Standard round filters can be operated at reasonable costs. Separators that represent an optimum regarding expenses do not necessarily have the lowest purchase price.

APTIC NO. 39878

21808

Hudson, Fred M.

ECONOMIC COSTS AND BENEFITS OF AN IMPROVED ENVIRONMENT. *In: Environmental Quality. A Survey of Costs, Benefits, Citizens Attitudes. Auburn Univ., Ala., Dept. of Civil Engineering, p. 71- 93, Oct. 1971.*

Future costs (capital and total annual costs) of municipal sewage treatment, industrial waste water treatment, solid-waste disposal, and air-pollution control in Alabama are projected to 1990. The total yearly cost of controlling all three forms of pollution in future years adds up to an estimated high of $170,000,000 or an estimated low of $81,000,000. For air pollution control alone, the annual cost will lie between $40,000,000 and $115,000,000. The results of a survey showing that Alabamans would be willing to pay $587.6 million/yr for clean water, clean air, and recreational facilities unspoiled by pollution are included.

APTIC NO. 40526

21809

Imamura, Shoji

PRESENT STATE OF ENVIRONMENTAL POLLUTION CONTROL EQUIPMENT INDUSTRIES. *(Kogai boshi sochi sangyo no genjo to tomensuru kadai) Text in Japanese. Kankyo Sozo (Environ. Creation), 1972:59-62, Jan. 1972.*

The air pollution control equipment designated by the Japan Industrial Machinery Engineering Association include categories of machines such as a dust collection system, oil desulfurization system, stack gas desulfurization system, stack gas treatment system, high stacks, and other related equipment. According to the investigation of the Association, the total production of public nuisance control systems for 1970 was $583,779,000, which was an increase of 363% over the production of the previous year. According to industrial classifications, those that showed an outstanding growth in total spending were mining (405.8% growth over 1969), government and public porgrams (308%), paper and pulp (294.5%), and food industries (254.5%). According to the categories of systems, the production installations of gas desulfurization systems grew 288.9% over 1969; but oil desulfurization system installations spent only 41.5% of the amount spent in 1969. In air pollution control systems alone, the total production was $252,726,000, and this was an increase of 114.5% over the previous year s production. In categories, the largest production figure was $119,442,000 for dust collection systems, followed by $54,393,000 for high stacks.

APTIC NO. 40439

21810

Jaske, R. T.

THE ECONOMICS OF ENVIRONMENTAL QUALITY. *Preprint, Washington State Federation of Women s Clubs and Washington State Federation of Garden Clubs, 22p., 1971. 6 refs. (Presented at the Washington State Federation of Women s Clubs and Washington State Federation of Garden Clubs, Environmental Workshop, North Bend, Wash., Aug. 12, 1971.)*

Rough estimates of the cost of making substantial improvements in the areas of air, water, and solid waste pollution run to between 20% and 35% of the estimated increase in GNP from 1970 to 1975. The largest item planned is the separation of storm and sanitary sewers amounting to 15% of the cost (40 billion dollars). Investment in tertiary sewage treatment in an attempt to stop eutrophication of streams and lakes was not planned but would cost 90 billion dollars. Probably more than 75% of the expenditures would be investment. The economic strain of these large scale investments may bring about the beginning of a new age of decentralization. The problems of the environment will not be solved without some deep change in American institutions.

APTIC NO. 39859

21811

Jones, A. Craig

STUDIES TO DETERMINE THE COSTS OF SOILING DUE TO AIR POLLUTION: AN EVALUATION. *Bull Va. Polytech. Inst. Water Resour. Res. Cent., no. 26:146-156, Oct. 1969. 8 refs.*

NTIS: PB 195424

Several studies to identify costs of household soiling due to air pollution have had limited success because of deficiencies in survey design and analytical techniques. More reliable results are expected to be obtained in a Philadelphia study of soiling costs. In this survey, household maintenance and cleaning operations likely to be adversely affected by particulate pollution will be identified. The frequency with which the tasks are performed will then be measured by questionnaires administered to a random sample of households in a least four pollution zones. After factor analysis of socio-economic factors contributing to the frequency, the relationship between frequency of cleaning and particulate pollution will be established by comparison of the zones of pollution. Accurate air quality measurements will be available for the study

APTIC NO. 39911

21812

Lakshmanan, T. R., F. Lo, and R. Byrne

THE OAP REGIONAL ECONOMIC MODEL UTILIZATION PHASE I. VOLUME I: SIMULATION AND ANALYSES. (FINAL REPORT). *Consad Research Corp., Pittsburgh, Pa., Office of Air Programs Rept. APTD-0946, 240p., Jan 7, 1972 131 refs.*

NTIS: PB 207319

A Regional Economic Model for the assessment of the effects of air pollution abatement was developed which is operational, policy oriented, and attempts to describe the economic system-wide effects of specific air pollution strategies in 91 major metropolitan areas in the United States. The Phase I model utilization effort was structured toward the following tasks: introducing a greater realism to the standards, costs, and variety of the strategies employed; updating economic data in response to recently implemented air quality regulations; consideration of the potential for extending the OAP model to water and land pollution; and identification of possible areas for further model refinement. (Author summary modified)

21813 APTIC NO. 39910

Robinson, J. M., G. I. Gruber, W. D. Lusk, and M. J. Santy

ENGINEERING AND COST EFFECTIVENESS STUDY OF FLUORINE EMISSIONS CONTROL. (FINAL REPORT). (VOLUME I). *TRW Systems Group, McLean, Va. and Resources Research Inc., McLean, Va., Office of Air Programs Contract EHSD 71-14, Rept. APTD-0945, SN 16893.000, 411p., Jan 1972.*

NTIS: PB 207506

Industrial emission sources were inventoried and a study was made of the technical and economic aspects of implementing soluble fluoride emission controls for major industrial sources. Industries included in the study were primary aluminum smelting, iron and steel, electrical power generation, phosphate rock processing, glass manufacture, frit smelting, heavy clay products, expanded clay aggregate, cement manufacture, hydrofluoric acid alkylation processes, HF production, and nonferrous metals smelting and refining. It is technically possible, though not economically profitable, to control soluble fluorides with available devices such as wet scrubbers; the immediate problem lies in implementation of that control, including collection of the evolved fluorides by hoods and similar effluent capture systems for treatment in the abatement devices. Included in the study are discussions of production trends extrapolated to the year 2000, process flow diagrams, estimates of current and projected fluoride emissions analyses of production and control process economics, recommendations for additional research and development programs, environmental and ecological effects of the emitted fluorides on animals, plants, man, glass, and materials, and techniques for sampling and measurement of fluoride pollutants in the various effluent streams.

21814 APTIC NO. 40453

Rockwell, Willard F., Jr.

POLLUTION CONTROL: THE MISSING DATA. *Automotive Eng., 80(6):24-27, June 1972.*

The economic consequences of pollution control are discussed. Recently, the Environmental Protection Agency has stated that $105 billion will be needed over a 5-year period for pollution control, with $25 billion of that sum coming from private investments. If Senate Bill 2770, which calls for the elimination of all pollutants, stands as written, the economic lives of all Americans will be affected. Many of our industries will be priced out of world markets due to stringent pollution standards. The technical problems that go along with pollution control will be solved; however, the economic aspects need further study. There are limits on how far and fast pollution abatement controls can be implemented without jeopardizing national economic performance. Data on potential job loss are needed. The portion of the costs of pollution control that are shouldered by industry are given; many industries are confronted by demands that put a tremendous strain on their economic resources. Judgments and choices should be made that seek a reasonable balance between national hopes and national capabilities.

21815 APTIC NO. 40558

Sanjour, William and Ellison S. Burton

THE RECOVERY OF TANK FILLING LOSSES. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 5p., 1970. 1 ref. (Presented at the Air Pollution Control Association, West Coast Section Technical Meeting, 5th, San Francisco, Calif., Oct. 8-9, 1970.)*

Tank filling losses occur in transferring gasoline from the refiner to the local refiner, then to the consumer. The cost effectiveness of the recovery of displaced vapors by a system of collection and condensation was described. The bulk terminal vapor recovery system was developed to capture vapors present in the compartments of tank trucks and return them to the storage tanks for future sale. The system consists of a series of double hose loading arms, a vapor holder tank, and the vapor saver unit itself, where the hydrocarbon vapors are adsorbed in gasoline and returned to storage. The loading underground service station tanks system uses a concentric fill hose in conjunction with the submerged fill pipe. As the gasoline is pumped into the tank from the inner hose, the vapors are returned to the tank truck through the surrounding outer hose. If the vent to the atmosphere is closed, efficiency of the double hose system is nearly 100%. A vapor recovery system for controlling the emissions from the filling of automotive gas tanks uses a similar system. Gasoline vapors forced out of the automobile gas tank are returned to the service station s underground tank. In addition, the system eliminates spillage as a source of emissions. The resultant cost effectiveness of all three controls is $0.0057/reactive ton/day/car over a 10-year period.

21816 APTIC NO. 40536

Schneider, Hans K. and Heinz Juergen Schuermann

ECONOMICAL ASPECTS OF ENVIRONMENTAL PROTECTION. *(Oekonomische Aspekte des Umweltschutzes). Text in German. Glueckauf (Essen), 108(11):440-447, May 25, 1972. 26 refs.*

Combating the pollution of our environment does not imply that the growth rate of the economy be reduced to zero, but it does require new economic thinking. Recycling will have to be promoted, as well as processes which avoid pollution of the environment. The operation with the highest possible profit will have to give way to a modified and limited profit orientation. At the same time, the freedom of the individual should be restricted as little as possible. For instance, traffic gravely pollutes the city atmosphere only in rush hours. Thus, governmental regulations should be restricted only to rush hour periods. In some cases protective measures against air pollution will be required only during certain weather conditions (inversion), in some cases more thorough measures will be required. A particular problem results from the long-term impact of environmental pollution on ecological cycles, for instance, drastic climatic changes are feared through the steady rise of the carbon dioxide concentration in the atmosphere. At the planning of governmental measures against environmental pollution, all areas of the industrial sector which are affected by it should be heard to avoid any problems.

21817 APTIC NO. 39956

Stormont, D. H.

U. S. REFINERS INVESTMENT IN CLEANER AIR SOON TO EXCEED $200,000,000. *Oil Gas J., 63(48):54-68, Nov. 29, 1965.*

The results of a survey of the air pollution control efforts of 170 petroleum refineries, representing 90.6% of current U. S. domestic capacity, are summarized, including returns by geographic areas, trends in annual expenditures by types of emissions (sulfur compounds, hydrocarbon combustion and recovery, smoke, particulates, odors, and fumes) for 1956 to 1965, research spending, and overall costs. Total annual spending for air conservation, including marketing and transportation, has been on the order of $21 million for 1961-65 and will exceed $41 million in 1966. The West Coast has the highest control expenditures of any refining district because of the more stringent regulations in force there. Spending for odor and fume control, a lesser category in previous years, will exceed all others during 1966, and expenditures for removing sulfur compounds, after a recent leveling-off, will increase markedly. Built-in controls in the design of new processing units are increasing as well as the number of firms having control programs. The cost implications and control effectiveness of regulations requiring the removal of sulfur from residual fuel oil and the production of lead-free motor fuels are evaluated.

21818 APTIC NO. 40559

Svoboda, E. J.

USE OF LPG ENGINES FOR THE CONTROL OF MOTOR VEHICLE AIR POLLUTION. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 7p., 1970. 1 ref. (Presented at the Air Pollution Control Association, West Coast Section, Technical Meeting, 5th, San Francisco, Calif., Oct. 8-9, 1970.)*

The use of a liquefied petroleum gas (LPG) fuel system for effectively reducing pollutants in the exhaust gas of internal combustion engines is practical and reasonably priced. The device used in cost effectiveness calculations was a three-component system consisting of a carburetor, converter-regulator, and filter- fuelock. Schematic diagrams showing the basic operation and typical installation on a automotive engine were presented. The cost savings potential of LPG versus gasoline was also tabulated. Atmospheric pollution of Los Angeles County by nitrogen oxides and hydrocarbons and their potential reduction were estimated in accordance with the cost effectiveness ground rules.

21819 APTIC NO. 40750

Woodcock, Kenneth R.

A MODEL FOR REGIONAL AIR POLLUTION COST/BENEFIT ANALYSIS. *TRW Systems Group, McLean, Va., Air Pollution Control Office Contract PH 22-68-60, 11130-W001-RO-00, 170p., May 1971. 93 refs.*

NTIS: PB 202353

The Cost/Benefit Model is an extension of the Implementation Planning Program. IPP has been used in evaluation of regional emission control strategies for the implementation of controls. The C/B Model relates predicted pollution to receptor data and damage functions. The exposure of receptors to pollutants is determined by the air quality receptor relationship. The damage function, which relates the annual cost of damage to pollution concentration, when applied to the dosage estimate, determines the damage cost estimate desired. Estimates of benefits, a reduction in damages, are calculated by subtracting damage estimates for alternate strategies from the damages caused by existing atmospheric conditions. The Model could be used for developing desirable air resource strategies consistent with existing and projected economic activity. As plans are implemented, it could be used to test the effectiveness of the program and identify needed policy changes. After attainment of a desirable air resource, it could be used to monitor steady state conditions and to establish policies for future economic growth. The quality of the model outputs will improve as the quality of the input data improves. (Author summary modified)

STANDARDS AND CRITERIA

21820 APTIC NO. 39864

Eidgenoessische Kommission fuer Lufthygiene, Zurich (Switzerland)

GUIDELINES FOR THE EVALUATION OF SULFUR DIOXIDE IMMISSIONS. *(Richtlinien zur Beurteilung von Schwefeldioxyd-Immissionen). Text in German. Bull. Eidgenoess. Gesundheitsamtes Beilage B, no. 2, 8p., April 3, 1965.*

In establishing guidelines for maximum allowable concentrations for sulfur dioxide, individual variations in sensitivity were taken into account. In general, temporary concentrations slightly above the limit value do not cause damage. The suggested limit values for SO2 concentrations are: 0.20 ppm from March 1 to Oct. 31, and 0.30 ppm from Nov. 1 to Feb. 28/29 as a daily mean; 0.30 ppm from March 1 to Oct. 31, and 0.50 ppm Nov. 1 to Feb. 28/29 as a half-hour mean that is allowed to be exceeded once within 2 hr.

21821 APTIC NO. 39886

California Air Resources Board, Los Angeles, Technical Advisory Committee

CONTROL OF VEHICLE EMISSIONS AFTER 1974. *36p., Nov. 19, 1969. 24 refs.*

The California Pure Air Act of 1968 (AB 357) established motor vehicle emission standards through the 1974 model year with the goal of returning the atmosphere in Los Angeles to its 1940 quality and maintaining it there until 2000. This objective requires a further reduction in emissions below the 1.5 g/mi hydrocarbons, 23 g/mi carbon monoxide, and 1.3 g/mi nitrogen oxides allowable under the 1974 standard. Measurements on laboratory vehicles with gasoline reciprocating engines have demonstrated that exhaust pollutants can be reduced to levels specified on the Low Emission Vehicle Act of 1968 (AB 356) by 1975. These are 0.5 g/mi hydrocarbons, 11 g/mi CO, and 0.75 g/mi NOx. Steam, gas turbine, and Stirling cycle engine demonstrations have yielded levels which are in some cases below the requirements of AB 356. However, these alternative powerplants are not yet equal in cost, operating economy, or flexibility to the gasoline piston engine controlled to the level of AB 356. Technologically feasible minimium emissions attainable by various control methods are discussed.

21822 APTIC NO. 39919

California Air Resources Board, Los Angeles, Technical Advisory Committee

ADDENDUM TO CONTROL OF VEHICLE EMISSIONS AFTER 1974. *27p., July 9, 1971. 14 refs.*

The Federal Clean Air Amendment of 1970 imposes a new vehicle test procedure using a different driving cycle, different instrumentation, and a different method of exhaust gas collection, known as the constant volume sample (CVS) procedure. Because the new driving cycle and CVS procedure almost double the ordinate magnitudes of tons/day emission rates, the relative contribution of the automobile to total emissions of hydrocarbons, carbon monoxide, and nitrogen oxides looms larger than before. The amendments also set more stringent vehicle exhaust emission standards for 1975-76 than California requirements when expressed in equivalent grams/mile as measured by the CVS procedure. The more severe Federal requirements may be met for hydrocrabons and carbon monoxide; with the current state of the art of nitrogen oxides control, the standard of 0.4 g/mile will probably not be reached. Progress made in meeting the 1975-76 goals is discussed, including control methods for conventional piston engines, alternative power plants, and alternative fuels.

21823 APTIC NO. 40515

POLLUTION CONTROL IN THE GREAT LAKES STATES. *Ind. Develop., 141(10):8-27, March/April 1972.*

A detailed presentation is given of the water and air quality standards of the Great Lakes States. The Illinois Air Quality Standards include limits on the emissions of visible pollutants, particulates, carbon monoxide, sulfur compounds, and nitrogen oxides. Indiana has air quality standards for: smoke; particulate matter from fuel combustion, process operations, and foundries; incinerators; ambient air; sulfur dioxide; and nitrogen oxides. The Kentucky Air Quality Standards apply to incinerators and particulate emissions from process operations and from fuel combustion in indirect heat exchangers. Michigan has established maximum allowable emissions of particulate matter for: fuel burning equipment; residential, commercial, industrial, and municipal incinerators; open hearth, basic oxygen, electric, blast, and heating/reheating furnaces; ferrous cupolas; and lime kilns. Standards have also been established for the ambient air, sulfur dioxide emissions, and smoke emissions. In Ohio, standards have been set for: visible emissions; incinerators; particulate matter from fuel burning equipment and from industrial processes; sulfur compounds from industrial processes; SO2 from fuel use; and nitrogen oxides. The Wisconsin Air Quality Standards have been established for: particulate matter from process operations, fuel burning installations, and incinerators; visible emissions; sulfur compounds; and nitrogen compounds. The water quality standards for each of these states are also presented.

21824 APTIC NO. 40550

Research Triangle Inst., Research Triangle Pakr, N. C., Statistics Research Div.

MOTOR VEHICLE ASSEMBLY LINE TESTING. (FINAL REPORT). *90p., Aug. 1970. 8 refs. National Air Pollution Control Administration Contract CPA 70-147, Rept. APTD-0718.*

NTIS: PB 203072

A preliminary study of the development and implementation of assembly line testing for carbon monoxide and hydrocarbon emissions indicates that a suitable short test could cost less than $5/ vehicle. The use of the Federal certification test would raise the cost to around $32/vehicle. Assembly testing requires 64 mo for development and a staff of 67 persons. The implementation requires the development of standards, inspection plans, techniques, and the organization for monitoring and audit of testing. Steps should be taken at once to meet the projected schedule. (Author conclusions modified)

21825 APTIC NO. 40952

UTILITIES ATTACK AIR ACT AGAIN. *Elec. World, 177(11):27-28, June 1, 1972.*

One by one, the tough anti-pollution standards of the 1970 Clean Air Act have come under attack by industry as impractical or too costly, and now utilities and other industries are zeroing in on the Act's crackdown on oxides of nitrogen. The new NOx standard of 0.7 lb/million Btu for coal-fired plants, critics point out, was set by the Environmental Protection Agency on the basis of tests with four units built by a single boiler manufacturer. Though these units met the standard over a brief test stint, there is no evidence that they can do so indefinitely under operating conditions. What the standards entail is substantial reworking of utility boilers to reduce flame temperatures or to cut back the amount of oxygen present in the flame zone. However, applicability of the techniques for doing this were attained with gas and oil burners rather than coal-fired units.

21826 APTIC NO. 40579

Amdur, Mary O.

REPORT ON TENTATIVE AMBIENT AIR STANDARDS FOR SULFUR DIOXIDE AND SULFURIC ACID. *Ann. Occupational Hyg., vol. 3:71-83, 1961. 48 refs.*

Ten statements about the toxicology of sulfur dioxide and sulfuric acid are presented, each followed by a discussion of the literature supporting the statement. Sulfuric acid is more toxic to animal species than is sulfur dioxide. There is no good evidence that either chronic exposure to concentrations below 5 ppm SO2 or occasional exposure to higher concentrations have any ill effect on healthy persons. In general, the average SO2 values reported for various urban communities are below 0.05-0.1 ppm. Corresponding values for H2SO4 are probably no greater than 0.02-0.04 mg/cu m. The importance of these compounds to the over-all air pollution problem lies mainly in the production of an acute response in sensitive individuals. The physiologic response to both is bronchial constriction. Three unrelated sets of standards are discussed, representing standards for occasional transient peaks of an hour or less; permissible average levels; and values pertaining only to reducing type pollution during periods of prolonged inversion. A level of 5 ppm SO2 is termed adverse, 10 ppm serious, and 20 ppm emergency for occasional transient peaks. A level of 1 mg/cu m H2SO4 is termed adverse, 3 mg/cu m serious, and 5 mg/cu m emergency. The permissible average level recommended for SO2 is 0.05 ppm; for H2SO4, 0.02 mg/cu m.

21827 APTIC NO. 40488

Giever, P. M. and J. G. O'Grady

REPORT OF COMMITTEE D-22 ON SAMPLING AND ANALYSIS OF ATMOSPHERES. *(Am. Soc. Testing Mater. Proc., vol. 71, 1971.*

The committee reported the initiation of Project Threshold, a program for interlaboratory testing of standard methods for sampling and analysis of atmospheres. The Society accepted the recommendations of the D-22 committee concerning new standards for a method of stack sampling for particulate matter and a method for the evaluation of air assay media by the monodisperse dioctylphthalate smoke test. Also included in the report are summaries of the activities of subcommittees on methods of sampling and analysis, instrumentation, gas chromatography, calibration, source sampling, particulates, and biological methods.

21828 APTIC NO. 407[illegible]

Jager, Lee E.

MICHIGAN AIR POLLUTION CONTROL REGULATIONS - AN IMPACT ON INDUSTRY. Michigan Univ., Ann Arbor; Eastern Michigan Univ., Ypsilanti; and Wayne State Univ., Detroit, Mich., Proc.: Mich. Water Air Pollut. Stand., 1970, p. 19-30.

Michigan air pollution regulations came into being because of the combined concern of the Michigan Department of Public Health, citizen concern, and an industry-wide desire for state, rather than Federal, control. Enabling legislation led to the emission limit approach because it would eliminate competitive advantage, and would be easier to measure and enforce. The process weight rate was developed which gives the allowable rate of emissions/hr as it is related to the tons/hr of materials handled. Regulations cover the emission of odors in what is commonly referred to as an all inclusive nuisance clause. Some industrial processes have become obsolete and others will follow. The cost of raw materials will increase and alternate sources will be sought. Production costs will increase for some industries. Alternate non-polluting processes will replace present methods. Economic upheavals may be forthcoming. A demand has been created for a new line of products and services required in the fight against pollution. Emission standards are discussed for fuel burning equipment (particulates), foundry cupolas, and other sources.

21829 APTIC NO. 40684

Kaneko, Yasuo

PRESENT AND FUTURE OF AUTOMOTIVE EMISSION REGULATION AND CONTROL. *(Jidosha haiki gasu no kisei to taisaku no genjo to shorai). Text in Japanese. Mitsubishi Sekiyu K. K. Gijutsu Shiryo (Tech. Rev., Mitsubishi Oil Co., Ltd.), 20(1):82-92, Nov. 1971. 5 refs.*

The historical background of air pollution in the world is briefly discussed. The Japanese method of automobile exhaust gas emission standard establishment is explained. The past, present, and the future policies of the United States and European countries concerning emission standards are briefly reviewed. Concentrations of various components in the automotive exhaust gas and various modes of operation are examined. The distribution of carbon monoxide and hydrocarbon concentration and the paths of the four mode and seven mode cycles, the concentrations of CO, HC, nitrogen oxides, and carbon dioxide and the seven mode cycle are presented in graphs. It was possible to conjecture active characteristics of CO from the static behavior of CO. It is possible to design basic modifications for meeting regulations from the characteristic curves of exhaust gas component behavior. The CO emission standard figure in the Japanese law is higher than that of the United States, but the levels are about the same. In proportion to the absolute emission figure, the Japanese standard is more strict than the U. S. standard. The problem of fuel evaporation loss from the fuel tank and carburetor is discussed.

21830 APTIC NO. 40525

Nakanishi, Kichizo

COMMENTARIES ON OFFICE HYGIENE STANDARD REGULATIONS. *(Jimusho eisei kijun kisoku no kaisetsu). Text in Japanese. Kuki Seijo (Clean Air - J. Japan Air Cleaning Assoc., Tokyo), 9(6):75-79, Jan. 1972.*

The Office of Hygiene Standard Regulations were issued on June 25, 1971 and were enforced in Sept. 1971. These regulations apply to offices where general clerical work, key-punching, typing, accounting, and other types of book work are carried out and other types of office machines are used. Offices must have an air space of 10 cu m per worker, a total window space or an equivalent opening leading directly to the outside air which would be more than 1/20 of the floor space. Regardless of the method of ventilation, the maximum carbon monoxide concentration in the air must be less than 50 ppm, and the maximum carbon dioxide concentration must be less than 5000 ppm. The room must be heated when the temperature is less than 10 C; however, if the office has an electronic computer, or an automatic telephone exchange system, or any other type of precision machinery which requires a given temperature, this temperature standard is not necessarily applicable. The temperature difference between the room and outside should be within 7 C when using air conditioning. When using air conditioning or other mechanical ventilation, the environmental conditions of the room must be as follows: less than 0.15 mg/l cu m of suspended particulates; less than 10 ppm of CC (when the air outside is polluted, less than 20 ppm); less than 1000 ppm of CO2; less than 0.5 m/sec of air flow; between 17 and 27 C temperature (only when air conditioning is used); and between 40 and 70% relative humidity (only when air conditioning is used). These systems must be inspected at least once in two months, and air quality measurements must be taken and meet the requirements. When combustion equipment is used in the room, exhaust pipes, ventilation fans, and other methods of ventilation must be used, and the equipment must be inspected daily.

LEGAL AND ADMINISTRATIVE

21831 APTIC NO. 39800

Tokyo Metropolitan Environmental Protection Research Inst. (Japan)

THE TOKYO METROPOLITAN ENVIRONMENTAL POLLUTION CONTROL ORDINANCE AND ITS ENFORCEMENT REGULATION. *84p., July 1971*

The Tokyo Metropolitan Environmental Pollution Control Ordinance, enacted in 1969 and revised in 1970, is intended to control polluting substances more severely than do various national laws concerning public hazards. The 68 articles constituting the provisions of the Ordinance are given together with the 40 articles constituting the Regulation for the enforcement of the Ordinance. The Ordinance summarizes the obligations of the Governor, entrepreneurs, and citizens with respect to environmental pollution and designates pollution sources subject to control standards. The sources include factories, designated workshops, motor vehicles, construction work, loudspeakers, pumping facilities for ground water and the burning of certain materials. The sources cannot emit soot, smoke, dust, poisonous gases, waste water, noise, vibration, or offensive odors in excess of standards specified in the Regulation. The Basic Law for Environmental Pollution Control (1967, 1970) is included as an appendix. Other national laws for environmental protection are listed.

21832 APTIC NO. 39907

TRW Systems Group, Redondo Beach, Calif.

AIR QUALITY IMPLEMENTATION PLAN FOR THE STATE OF ALASKA. VOLUME III: PERMIT SYSTEM. *Office of Air Programs Contract 68-02-0048, Rept. APTD-0971, 33p., Dec. 1971.*

NTIS: PB 208328

Registration and permit requirements are detailed, including guidelines for minimum requirements for various types of process and fuel burning equipment. Also described are conditional permits to operate, exemptions, form and processing of permit applications, hearings, source surveillance, air quality control jurisdictions, and data management. State and local responsibilities are given.

21833 APTIC NO. 39908

TRW Systems Group, Redondo Beach, Calif.

AIR QUALITY IMPLEMENTATION PLAN FOR THE STATE OF ALASKA. VOLUME VI: RESOURCES. *Office of Air Programs Contract 68-02-0048, Rept. APTD-0976, 49p., Dec. 1971.*

NTIS: PB 208333

Areas of responsibility within the statewide air pollution control program are outlined, including management, engineering, enforcement, and technical services; and manpower and revenue needs for these tasks are estimated. Existing manpower and revenue resources from various state, local, and private agencies are surveyed; specific projections concerning required personnel and capital equipment are described. Taxation, permit fees, penalties, state assistance, and federal assistance are revenue sources.

21834 APTIC NO. 39912

TRW Systems Group, Redondo Beach, Calif.

AIR QUALITY IMPLEMENTATION PLAN FOR THE STATE OF ALASKA. VOLUME I: CONTROL STRATEGY. *Office of Air Programs Contract 68-02-0048, Rept. APTD-0926, 92p., Dec. 1971. 29 refs.*

NTIS: PB 207700

The northern, south central, southeastern, and Cook Inlet intrastate air quality control regions of Alaska were analyzed according to topography, climatology, soil characteristics, and existing air quality. Regional growth and potential new population sources were projected for each of the four areas. Control strategies are proposed for sulfur and nitrogen oxides, particulates, and carbon monoxide. Suggested strategies include air monitoring studies, process and boiler emission limitations, a permit system to regulate construction and modification of new facilities, traffic control, fuel changes, and street paving and sweeping.

21835 APTIC NO. 39975

ENVIRONMENTAL PROTECTION IN SWEDEN. *Indian Eastern Engr. (Bombay), 113(12):639-643, Dec. 1971.*

The air pollution problem in Sweden is confined to the principal towns and areas adjacent to certain industrial complexes. Although the water supply is generally good, there has been an increased amount of cellulose and chemical discharge into the rivers and lakes. The growth of large cities has also brought increased noise levels. The use of mercury in agriculture and industry has resulted in depopulation among Swedish fauna, various birds have been decimated, and some fish has become inedible. During the spring of 1969, the Riksdag passed a law of environmental protection which came into force on July 1, 1969, incorporating measures against water and air pollution, noise, and other disturbances. The law specifically limits the sulfur content of heating oil to 2.5% and motor vehicle discharges of carbon monoxide and hydrocarbons to 45 g/km and 2.2 g/km, respectively. Also, alkyl mercury and DDT were banned. Governmental subsidies are supporting the costs of environmental protection by industries and the construction of communal sewage purification plants. A general summary of central and local authority expenditure on environmental protection is presented.

21836 APTIC NO. 39995

DIRECTORY OF ENVIRONMENTAL OFFICIALS. *Chem. Eng. Deskbook, 79(10):27-30, 34-36, May 8, 1972.*

Regions of the Environmental Protection Agency, National Environmental Research Centers, and state air and water pollution control agencies are listed with addresses. A chart of administrators and staff officers of the EPA is also given.

21837 APTIC NO. 40003

Niihama Municipal Government (Japan)

AGREEMENTS ON ENVIRONMENTAL PROTECTION. *(Kogai boshi kyoteisho). Text in Japanese. 43p., Feb. 1972.*

Separate but similar agreements were signed between Saijo and Niihama cities with Sumitomo Metal Mining Co.; Niihama City and Sumitomo Chemical Engineering Co.; Niihama City and Sumitomo Nogatack Ehime Plant; and Niihama City and Sumitomo Electric Industries. The agreement between the two cities and Sumitomo Metal Mining Co. includes adherence to less than sulfur oxide emission standard of K value 10.5, the use of fuel containing less than 1.5% of sulfur, desulfurization of stack gas by caustic soda, a dust emission standard of less than 0.2g/N cu m (0.3g/N cu m for dryer), and the use of enclosed belt conveyors for transportation of refined ore. The agreement between Niihama city and Sumitomo Chemical Engineering Co. includes the adherence to the sulfur oxide emission standard of less than 0.16 ppm/hr; reduction of emission by more than 10% when reaching 0.16 ppm/hr; reduction of emission by more than 20% when the atmosphere reaches the figure specified by the Air Pollution Control Law and by more than 50% in case of emergency; and maintenance of stock fuel containing less than 1.2% of sulfur enough for 12 hr of operation. The other agreements contain similar items.

21838 APTIC NO. 40034

Kita-Kyushu Municipal Government (Japan), Public Nuisance Control Bureau

ENVIRONMENTAL POLLUTION IN KITA-KYUSHU CITY. *(Kita-Kyushu shi no kogai). Text in Japanese. 225p., Sept. 1971.*

The general condition of the city, the pollution control system, the present situation, the control plan, the complaints, and the petition are described. The city has a population of slightly more than one million, and 2450 plants, among which, 25 plants have more than 500 workers. Besides the Municipal Bureau of Public Nuisance Control, there are a Public Nuisance Control council and an Air Pollution Control Council. About 500,000 dollars was used during the year of 1970, and 600,000 dollars during the year of 1971. There are 15 observation stations in the city. The average sulfur oxides concentration during the year of 1970 was 1.282 mg/100 sq cm/day. The highest monthly average of nitric oxide concentrations was 0.05 ppm, and nitrogen dioxide concentration was 0.04 ppm during the same year, and the average concentration of particulates was 19.21 g/sq cm/mo. The average concentration of carbon monoxide was about 5 ppm/mo. Facilities subjected to the pollution control regulations were tabulated. About 3,700,000 kl of heavy oil having an average sulfur content of 1.66% were consumed in 1970. The symptoms of school children caused by pollutants in air were also investigated.

21839 APTIC NO. 40039

Osaka Prefectural Government (Japan)

HISTORY OF COUNTERMEASURES TAKEN AGAINST MOTOR VEHICLE EXHAUST GAS IN OSAKA. *(Osaka ni okeru jidosha haigasu taisaku no ayumi). Text in Japanese. 202p., March 1969.*

Countermeasures against automobile exhaust gas are discussed. An idling adjustment was used in Osaka prefecture. The composition of exhaust gas and its effect on the human body, and the change in the number of automobiles and amount of gasoline used are mentioned. The present situation of pollution due to automobile exhaust gas is discussed, including results obtained from surveys. Countermeasures against automobile exhaust gas taken in the U. S. and European countries are mentioned. Japanese countermeasures and countermeasures in different Japanese cities are explained, including the idling adjustment. Various standards and equipment accompany the adjustment as countermeasures. A conference for promoting the popularization of countermeasures against automobile exhaust gas in Osaka is discussed. Special efforts should be given for the popularization of the idling adjustment.

21840 APTIC NO. 40254

Ministry of International Trade and Industry (Japan), Pollution Prevention Planning Section

PUBLIC NUISANCE CONTROL MEASURE BUDGET OF THE MINISTRY OF INTERNATIONAL TRADE AND INDUSTRY 1972. *(Showa 47-nendo Tsusho Sangyo-sho kogai taisaku yosan ni tsuite). Text in Japanese. Kogyo Yosui (Ind. Water), no. 162:13-20, March 1972.*

The 1972 budget presented by the Ministry of International Trade and Industry for pollution control plans is 2.1 times the amount spent the previous year. The general fund is $17,748,000, public nuisance control subsidies and loans through national banks and public funds are $135 million, and the amount requested for tax reduction program on imported crude oil is $141.3 million. The total amount budgeted for investigation and guidance toward prevention of industrial pollution is $1,074,000, of which $60,000 is for Okinawa. In this category, the budget for water pollution is $24,000, air pollution $18,000, and noise and vibration $21,000. The subsidies and loans for industries are for such pollution prevention and control programs as installation of oil desulfurization systems; gasoline lead elimination system; electric power plant use of liquefied natural gas; soot and odor control systems; pollutionless manufacturing processes; and stack gas desulfurization systems. A detailed breakdown of the budget is provided.

21841 APTIC NO. 40279

TRW Systems Group, Redondo Beach, Calif

AIR QUALITY IMPLEMENTATION PLAN FOR THE STATE OF ALASKA. VOLUME IV: EMERGENCY EPISODE PLAN APPENDICES. *Office of Air Programs Contract 68-02-0048, Rept. APTD 0974, 36p., Dec. 1971.*

NTIS: PB 208331

Laws of Alaska are presented establishing the Department of Environmental Conservation, and defining its responsibilities, means, and policies. Under Title 46 are defined the laws of the state with regard to water, air, radiation, and pesticide pollution control. Article 7, Title 46 describes prohibited acts and penalties. A definition of terms is also included within the body of the laws. The second appendix lists weather stations in Alaska, detailing the nature and frequency of synoptic, hourly, upper wind, radiosonde, and ice reports from each station.

21842 APTIC NO. 40280

TRW Systems Group, Redondo Beach, Calif.

AIR QUALITY IMPLEMENTATION PLAN FOR THE STATE OF ALASKA. VOLUME IV: EMERGENCY EPISODE PLAN. *Office of Air Programs Contract 68-02-0048, Rept APTD-0973, 48p., Dec. 1971.*

NTIS: PB 208330

The criteria for the three levels of air pollution episodes - alert, warning, and emergency are described. The alert level marks the threshold at which selective control action is to be initiated. The warning level indicates a health hazard which requires the curtailment of certain industrial activities according to a prearranged schedule. The emergency level defines a threshold of air pollution which constitutes a substantially dangerous health hazard. The stages are specifically defined with respect to pollution levels of particulates, carbon monoxide, and sulfur dioxide. Also measures are established to alleviate the danger of each of these three pollutants at the three episode levels. Operational procedures including weather forecasting, air quality data acquisition, declaration of episode stages, episode action plan implementation, and source surveillance are detailed.

21843 APTIC NO. 40282

TRW Systems Group, Redondo Beach, Calif.

AIR QUALITY IMPLEMENTATION PLAN FOR THE STATE OF ALASKA. VOLUME III: PERMIT SYSTEM APPENDICES. *Office of Air Programs Contract 68-02-0048, Rept. APTD-0972, llp., Dec. 1971.*

NTIS: PB 208329

The following terms are defined: stationary source, new source, modification, owner/operator, existing source, and air pollution control authority. Also included are the registration form and the form for the application for authority to construct and/or permit to operate.

21844 APTIC NO. 40287

Dept. of State, Washington, D.C.

U. S. NATIONAL REPORT ON THE HUMAN ENVIRONMENT. *Preprint, United Nations, New York, General Assembly, 53p., 1972. (Presented at the United Nations Conference on Human Environment, Stockholm, Sweden, June 1972.*

GPO: 0-427-943

Environmental problems, existing and proposed actions to effect solutions, and proposals for international action are discussed. Trends in human settlements, natural resource use, pollution and nuisance problems are reviewed for the United States with respect to air and water pollution, radiation, noise, solid waste, and pesticides. Air pollution control to the full extent of technology must be insured. New organizations and institutions, new management techniques, rapid application of new technology and new directions for research are proposed to control water pollution. Radiation hazards are strictly government controlled; research into the effects of low level doses arising from medical uses and consumer products should be continued, along with strenghtened radiation safety training. Control of solid waste problems must extend into reductions in the generation of wastes and improvements of waste managements. The Environmental Protection Agency has been assigned responsibility to unify the regulatory functions involving pesticides. Since other nations face similar environmental problems, international cooperation is proposed with respect to the acquisition and dissemination of knowledge; establishing a system for exchanging environmental information; systems for monitoring the world environment; public education; coordination and cooperation in research; formulation 0of environmental policies, in limiting the degradation of the global environment; research programs; improved management of natural resources; and prerequisites for concerted action in increasing technical and managerial competence as well as organizational arrangements.

21845 APTIC NO. 40356

CONSTRUCTION OF A REFUSE COMPOSTING PLANT AGINST THE RESISTANCE OF THE NEIGHBORS. *(Einrichtung eines Muellkompostwerkes gegen den Widerstand der Nachbarn). Text in German. Wasser Luft Betrieb, 16(4):127, April 1972.*

The administrative court of Baden-Wuertemberg ruled under file no. VI-429/71 that a refuse composting plant with incineration can be constructed by the city despite the resistance of neighbors who protested the air pollution that would result from burning polyvinyl chloride contained in the refuse, fearing that the developing hydrochloric acid gas would have a harmful effect on human health. The administrative court rejected the claim, stating that the planned method of the refuse disposal was the best one available, considering the fact that an open dump would be even more dangerous to human health and that removing the refuse by sanitary landfill was not possible owing to the critical space situation of the city. Since the incineration plant will be equipped with a chimney 80 m high the quantity of hydrochloric acid emitted into the air is expected to be so small as to preclude any health hazards.

21846 APTIC NO. 40372

Ministry of International Trade and Industry (Japan), Agency of Industry Science and Technology

ENVIRONMENTAL SCIENCE TECHNOLOGY. *(Kankyu kagaku gijutsu). Text in Japanese. Kagaku Gijutsucho Nenpo (Annu. Rept. Sci. Technol. Agency), no. 15:52-56, Nov. 1971.*

With the development of photochemical smog in July 1970, a series of emergency research projects were initiated by various government agencies with a special research promotion subsidiary fund. The Ministry of International Trade and Industry studied direct desulfurization techniques for heavy oil, stack gas treatment methods, and automobile exhaust gas treatment technology. This last reasearch program was carried out in conjunction with the Ministry of Transportation. Studies on the effects of air pollution on human health, animals, and plants were carried out by Ministry of Health and Ministry of Agriculture and Forestry. Specific research programs subjects include automobile exhaust gas components for improving engines suitable for unleaded gasoline, olephin and aromatic hydrocarbons and nitrogen oxides in relation to fuel; and fuel additives and operating conditions, for the purpose of obtaining basic data for establishing emission standards for hydrocarbons and nitrogen oxides, and for developing engine operation modification. Special studies are also being conducted to develop laser and radar techniques for measuring air pollutants. Special studies on photochemical smog include analyses of pollutant behavior in a smog chamber by irradiating various components with ultraviolet rays, and obtaining standard measurement methods for oxidants. Meteorologic studies of coastal weather are also being conducted in connection with air pollution.

21847 APTIC NO. 40408

Aichi Prefectural Government (Japan)

AGREEMENT OF ENVIRONMENTAL PROTECTION. *(Kogai boshi kyoteisho). Text in Japanese. 13p., March 1972.*

Agreements were signed between Aichi Prefecture and Chita City, and Toa Petroleum Co., Ltd., which is planning the construction of a refinery with a capacity of refining 200,000 barrels of petroleum/day in the landfilled area of the coastal industrial region south of Nagoya. Main points of the agreements include special provisions to be made by the Toa Petroleum Co. for prevention of air, water, and odor pollution, noise, and vibration prior to the construction and operation of the refinery. The building plans for the initial construction and any additional construction should be submitted to Aichi Prefecture and Chita City for approval, and emission standards should be followed strictly. Specifics of the agreements include, collectivization of stacks; 120 m stack height; sulfur content of less than 0.6% in crude oil; less than 0.4% average sulfur content with the mixture of gas; less than 410 N cu m/hr of total emission of sulfur oxides (the total emission should be less than 300 N cu m/hr on days when only 100,000 barrels of petroleum are refined/day). If sulfur oxide emission standards are revised in the future, the new standards must be applied. Necessary equipment for measuring sulfur content should be installed and the sulfur content in fuel must be checked continuously; automatic SOx measurement device must be installed in the flue and continuous monitoring should be carried out; electrostatic precipitators should be installed; soot concentration must be checked more than once a month; emission of nitrogen oxides should be controlled and monitored automatically and continuously; sulfur content in the refined product should be continuously monitored; and the records of all measurements should be kept for 3 years.

21848 APTIC NO. 40461

ENVIRONMENT PROTECTION. *(Umweltschutz). Text in German. Tech. Ueberwach. (Duesseldorf), 13(5):181-187, May 1972.*

The German Federal Government is actually reading the bill concerning the protection against harmful environment influences due to air pollution. The bill states that plants emitting air polluting gases or substances require a special authorization. The supervision of emissions will be intensified. Analyses have been made in various enterprises like melting plants, incineration plants, and cement works concerning the emission of dust, sulfur dioxide, sulfuric acid, gaseous fluoride and chloride compounds, hydrogen chloride, hydrogen sulfide, and carbon monoxide. With regard to the emission of CO, nitric oxide, and hydrocarbons by automobile engines, a test station has been established at Essen which undertakes all exhaust gas examinations. However, these examinations concern only relatively new vehicles so that a sensible reduction of the CO contents in the exhaust gases will be reached only if the new exhaust gas prescriptions are generally valid for all vehicles.

21849 APTIC NO. 40486

ELIMINATION OF LEAD FROM AUTOMOBILE GASOLINES. *(Elimination du Plomb des Essences pour Automobiles). Text in French. Protectio Vitae, no. 1:30, 1972.*

The International Society for Research into Civilization Diseases and Vital Substances issued a new resolution concerning the fight against the toxic effects of lead. It states that lead content in gasoline should be reduced as soon as practically possible. Instead of the present general limit of 0.4 to 0.6 g/l, one should aim for a reduction to 0.2 g/l in 1972, and 0.1 g/l in 1974. Vehicles now taxed on the basis of cylinder volume, should be so taxed to encourage changes in design favorable to a decrease in pollution. There should be higher taxation on lead bearing gasoline. Display and storing of food in the open in streets with heavy traffic should be prohibited. Effective measures should be taken for protection against the dangers of highly toxic organic lead compounds; for prohibition of use of lead carrying gasoline for cleaning; for protection of persons with regard to inhaling, and to exposure of their skin to toxic compounds. Possibilities of replacing tetraethyl lead as antiknock agent in gasoline by a different additive should be studied. Routine recording, on a world wide scale, of lead content in the atmosphere should occur. Other studies, including research into the biological effect of lead present in traces only, should be made.

21850 APTIC NO. 40529

POLLUTION CONTROL AGREEMENT NO. 4. POLLUTION CONTROL AGREEMENT BETWEEN FUKUI PREFECTURE AND MIKUNI TOWNSHIP, AND HOKURITSU ELECTRIC POWER CO. AND A MEMORANDUM. *(Kogai boshi kyotei (4), Fukui-ken oyobi Mikuni machi to Hokuriku Denryoku(kabu) tono kogai boshi kyoteisho narabini oboegaki). Text in Japanese. Kogyo Ricchi (Ind. Location), 10(7):49-50, July 1971.*

Agreements were signed by Fukui Prefecture, Mikuni Township, and the Hokuriku Electric Power Co. prior to the construction of Fukui Thermal Power Plant in order to maintain the environmental conditions and the health of the people in the area. Agreements were reached that the stack height be 150 m high, that the best quality oil or crude oil be used, that 3000 kl of fuel with less than 0.1% sulfur content be kept in storage at all times for emergency, that electrostatic precipitators be used for dust collection, and that ammonia additives be used to neutralize stack gas.

21851 APTIC NO. 40617

Voorhees (Alan M.) and Associates, Inc., McLean, Va. and Ryckman, Edgerley, Tomlinson and Associates, St. Louis, Mo.

A GUIDE FOR REDUCING AUTOMOTIVE AIR POLLUTION. *Office of Air Programs Contract CPA 70-100, 80p., Nov. 1971. 56 refs.*

NTIS. PB 204870

Methods to reduce automotive emissions by means of traffic operation and transportation planning measures are described. Techniques for improving traffic flow considered most likely to be effective were reverse-lane operations on freeways; widening intersections, reversible lanes, and reversible one-way streets for arterials; and for improved downtown traffic distribution traffic responsive control, one-way street operations, loading operations, and a comprehensive program of traffic engineering. Techniques for reducing auto traffic were also considered, including gasoline taxation and rationing, road user taxes, auto-free zones, parking bans, and improved road facilities for buses. Legislation, meteorology, and topographic effects are mentioned.

21852 APTIC NO. 40685

PROHIBITION OF OIL-BURNING INSTALLATIONS? Verbot von Oelfeuerungen. Text in German. Sanit. Heizungstech. 36(12):709, Dec. 1971.

In order to avoid air polluting emissions by burning installations, the German City Federation regulates the utilization of gas, electricity, and long-distance heat. No one is allowed to use drainage pits any longer, if the connection to a sewage system is possible. It should also be forbidden to use oil or coal which pollute the air by emissions, if the utilization of other harmless fuels is possible. The Bavarian Ministry for Environment Problems will present a bill which regulates the connection to long distance heat or gas systems in roder to restrict the utilization of harmful substances for heat supply, especially in densely populated regions. Emission taxes may be levied in the case of installations which burn air polluting substances.

21853 APTIC NO. 40756

TRW Systems Group; Redondo Beach, Calif.

AIR QUALITY IMPLEMENTATION PLAN FOR THE STATE OF ALASKA. VOLUME II: COMPLIANCE SCHEDULE. *Office of Air Programs Contract 68-02-0048. Rept. APTD-0950, 6p., Dec. 1971.*

NTIS: PB 208337

Control measures for particulates include the requirement that all point sources apply reasonably available control technology to reduce emissions. All sources emitting from 5 to 100 tons/yr uncontrolled must register with the appropriate agency, and sources which emit 100 tons or more/yr must apply for a permit authority to construct, modify, or operate. All compliance schedules must be submitted on or before the prescribed date for submittal of the first semi-annual report. Also, a series of special studies will be conducted to facilitate solution of the particulate problem, including road surfacing and a planting program on all lands from which ground cover has been removed. The 50% rollback in carbon monoxide emissions in Fairbanks required by the National Ambient Air Quality Standards is expected to be met by the Federal Motor Vehicle Program, prohibition of unattended cars left idling, and completion of a bypass roadway.

21854 APTIC NO. 40082

Adinolfi, G.

COUNCIL OF EUROPE S ACTIVITIES IN THE FIELD OF AIR POLLUTION PREVENTION. *International Union of Air Pollution Prevention Association, Intern. Clean Air Congr. Proc., London, England, 1966, p. 279-281. (Oct. 4-7, Paper VII/7.)*

The duties and working program of the Council of Europe in the field of air pollution prevention are reviewed. The European conference on air pollution in 1964 created a committee of governmental experts charged with the task of preparing an agenda. The program includes drawing up technical and scientific recommendations or agreements proposed by national or intergovernmental experts; diffusion of material received from information centers in member countries; and convening, in due course, a new convention. The responsibilities of the World Health Organization, the Organization for Economic Cooperation and Development, the World Meteorological Organization, and the Economic Commission for Europe are also outlined. (Author abstract modified)

21855 APTIC NO. 39845

Alpern, Anne X.

PROBLEMS IN STRICT ENFORCEMENT OF AIR POLLUTION CONTROL. *Interdepartmental Committee on Air Pollution, Washington, D. C., Air Pollut., Proc. U. S. Tech. Conf., Washington, D. C., 1950, p. 722-725. (May 3-5, Louis C. McCabe, ed.)*

In the last ten years, thanks to the educational campaign put on by the newspapers of Pittsburgh, the situation with regard to smoke control has changed. While the city has 1675 violations a year, it has been the custom of the smoke control bureau to send all violators a note first, advising them of the violation charged. After ten days, the plant owner, manager, and janitor are asked to come in to determine the violator. Because the program is educational rather than punitive, the bureau then proceeds to find out the cause of the smoke and attempts to eliminate it by giving technical advice. In addition to a staff in the smoke control bureau, about 1000 persons a year call in to complain, and as such are unofficial smoke sentinels. Some suggestions are made for the benefit of jurisdictions that have not attempted to prepare a smoke ordinance. The courts will sustain a smoke ordinance in any community where public opinion has reached that point where everybody realizes the need for it. Until there is strong public opinion, the smoke ordinance will not be enforced.

21856 APTIC NO. 40261

Altner, Helmut

WITH PRESSURE INTO ENVIRONMENTAL PROTECTION. *(Mit Druck zum Umweltschutz). Text in German. Tech. Umweltmag., no. 2:35-36, April 1972.*

The Ministry of Environmental Protection of France is one year old and has accomplished a great deal. Regulations concerning the consumption of sulfur-containing liquid fuels, which have been in effect in Paris since 1962, have been expanded to include all neighboring districts up to a distance of 50 km and all industrial centers of the country. New standards for the maintenance of clean air have been introduced. Industries will have to modernize their air cleaning facilities. This will increase the production costs for certain industries enormously. According to estimates, power production costs will rise by 1.5%, and cement production by 3.5%. Emission limits for automobile exhaust gas have been worked out. Non-compliance with these regulations will be punished by withdrawal of the operating license and by fines.

21857 APTIC NO. 40215

Barth, D. S.

STRATEGY FOR ENVIRONMENTAL RESEARCH IN THE 70 S. *Preprint, Missouri Univ., Columbia, 15p., 1971. (Presented at the Conference on Trace Substances in Environmental Health, Annual, 5th, Columbia, Mo., June 29, 1971.)*

The emerging philosphy for future environmental research under the sponsorship of the Environmental Protection Agency is reviewed. The emphasis will be on a systems approach to environmental appraisal and the determination of total adverse effects of pollutants on both man and the environment. Environmental research needs for the future are identified in a general fashion with emphasis on determination of control needs for pollutants to abate known or suspected adverse effects on man or the environment. Research on the social and economic impacts of environmental pollutants and their control is needed. The difficulty of converting research needs into integrated action research programs is examined. The problem of assigning priorities to needed research projects when insufficient resources are available to perform all the projects is discussed; integreted central program planning and management control systems are necessary. (Author summary modified)

21858 APTIC NO. 40552

Benner, D. A.

TAX ASPECTS OF EQUIPMENT PURCHASE AND USE. *Preprint, American Foundrymen s Society, Des Plaines, Ill., 7p., 1970. 11 refs. (Presented at the Total Environmental Control Conference, Ann. Arbor, Mich., Nov. 16-19, 1970, Paper 1-2.)*

Governmental taxing policy attempted to encourage the installation of pollution control equipment in a variety of ways. Tax subsidies, credits, rapid write-offs, and fines were all implemented at various levels of government. These incentives and disincentives vary in degree and are applied selectively and across the board. The nature and depth of some of these measures adopted by federal and state governments is analyzed. The Tax Reform Act of 1969 states that taxpayers may elect to amortize a certified pollution control facility over a 60 mo period. State tax incentives were also discussed.

21859 APTIC NO. 39870

Berlin, Edward, Gladys Kessler, and Anthony Z. Roisman

LAW IN ACTION: THE TRUST DOCTRINE. *In: Law and the Environment. Malcolm F. Baldwin and James K. Page, Jr. (eds.), New York, Walker and Co., 1970, p. 166-181. 24 refs.*

The use of the trust doctrine to prevent environmental losses was discussed. Three different types of property were examined: property owned by the government, property owned by private individuals and used in a manner consistent with public interest, and property owned by private individuals and used in a manner inconsistent with public interest. A trust is a specialized legal form and to invoke its protection properly it is necessary to talk in terms of trustees, trust property, beneficiaries, and trust duties. By developing each of these elements it is possible to materially increase the effectiveness of the trust doctrine. With specifically defined trust duties and identifiable trustees those who seek to protect property will have a much firmer basis for arguing that a governmental agency has specific duties with respect to the property and has an affirmative duty to preserve the trust property and to avoid wasting its assets. A specific example of the trust doctrine is given in a hypothetical problem dealing with Federal responsibility to protect land.

21860 APTIC NO. 40946

Blowers, Jay H.

THE UNITED STATES POSITION ON ENVIRONMENT. *Am. J. Public Health, 62(5):634-638, May 1972. (Presented at the American Public Health Association, Annual Meeting, 99th, Minneapolis, Minn., Oct. 13, 1971.)*

While the United States has specific and well-defined objectives and goals in the field of international environmental affairs, its positions are in a constant process of development and formation. Positions are quite distinct from objectives; they differ for problem areas and organizations and must of necessity be somewhat flexible. Some basic questions that have been asked as to the relevance and need for any efforts in the international environmental field are examined, particularly when there are so many environmental problems right here at home. Speculations that the buildup of carbon dioxide from fossil fuel use will warm up the atmosphere and the controversy surrounding DDT are mentioned. While many countries have found solutions to certain environmental problems, the problem is that other nations of the world are not aware of these solutions. Knowledge, experience, and technology must be shared. When nations adopt differing standards with respect to pollution abatement or allocate the costs differently, the effects on international trade are obvious. The United Nations Conference on the Human Environment which is to be held in Sweden from June 5-16, 1972, is discussed, including some of the topics which are to be considered.

21861 APTIC NO. 40417

Carpenter, Richard A.

NATIONAL GOALS AND ENVIRONMENTAL LAWS. *Technol. Rev., 74(3):58-63, Jan. 1972.*

The goal of productive harmony between technological prowess and social and environmental quality depends upon the development of social conscience. An adequate standard of living seems just barely within the grasp of civilization and can only be achieved by the most intelligent use of natural resources. Knowledge of environmental science is not yet sufficient to specify the exact principles but directions away from current practices are clearly needed. Deep public concern will make possible a broadly supported ethic that can be the ultimate basis for progress. Our laws governing wilderness and water management are internally inconsistent. Legislation now provides for continued economic exploitation as well as protection of environmental values.

21862 APTIC NO. 40008

Crawford, Gene M.

A GUIDE FOR ENVIRONMENTAL HEALTH PLANNING. *J. Environ. Health, 34(4):413-416, Jan.-Feb. 1972.*

A thorough inventory of existing community conditions and resources is needed to provide a base for planning future needs in a growing community. A guide is presented of objectives and resources to be assessed in the areas of water pollution, liquid waste disposal, housing maintenance, solid waste disposal, air pollution, food and food protection, rodent control, insect control, migrant labor camps, recreation sites, mobile homes, trailer parks, schools, institutions, public buildings, industrial hygiene, noise abatement, nuisances, manpower, and financing.

21863 APTIC NO. 39848

Damon, W. A.

LEGAL ASPECTS OF ATMOSPHERIC POLLUTION AND METHODS OF CONTROL USED IN GREAT BRITAIN. *Interdepartmental Committee on Air Pollution, Washington, D. C., Air Pollut., Proc. U. S. Tech. Conf., Washington, D. C., 1950, p. 747-764. 33 refs. (May 3-5, Louis C. McCabe, ed.)*

In Great Britain, the problem of atmospheric pollution is broadly divided into two parts by the statutes, namely, smoke and dust nuisances on the one hand and noxious or offensive gases from certain types of chemical processes on the other hand. For smoke and dust nuisances, the initiative lies with the local sanitary authorities, that is the borough, urban district, and rural district councils which are locally elected bodies having statutory powers and duties and answerable in certain respects to the Minister of Health. The problem of fumes from chemical processes is mainly dealt with by the central authority, namely, the Alkali Inspectors who have statutory powers and who are appointed by and report to the Minister of Health. Both by statute and informality there is a good deal of interaction and consultation between the local and central authorities on both sides of the problem. In the United Kingdom, local acts often serve as experiments or pathfinders to the general law. If the provision made by a local act proves useful, it becomes common and then standard, and finally the provision has been enacted in a general act. Processes registrable under the Alkali and Works Regulation Act of 1906 are indicated, as well as processes outside the scope of the act, smoke nuisances, and burning spoilbanks.

21864 APTIC NO. 39918

Damon, W. A.

THE ALKALI ACT AND THE WORK OF THE ALKALI INSPECTORS. *Roy. Soc. Promot. Health J., 76(9):566-575, Sept. 1956. 8 refs. (Presented at the Health Congress, Conference of Sanitary Inspectors, Blackpool, England, April 26, 1956.)*

The British Alkali Works Regulation Act of 1906 is discussed. The principal requirement of the Act is that the best practicable means shall be used for the control of noxious or offensive emissions, a provision that applies not only to the control of waste gases but also to the proper supervision of the process from which they evolved. This is of particular importance because excessive emissions are often due to process irregularities, and means that the inspector must be able to diagnose such problems and to specify remedies. Methods prescribed for dealing with noxious discharges include those based on the absorption of the gas or its employment in the production of a material of value, e.g., the absorption of sulfur dioxide in alkali to produce sulfates; the use of hydrogen sulfide in the production of sulfur; and the absorption of nitrogen oxides to produce nitric acid. Another broad category includes methods based on absorption or destruction of the gas, possibly involving the production of a valueless residue. Examples are the destruction of odorous materials by direct combustion or by contact with an oxidizing agent such as hypochlorite, and absorption in a large volume of medium such that the resulting solution is weak and of no value. Dispersion from chimneys is also considered. Industries regulated by the Act include sulfuric acid processes, viscose processes, cement manufacture, petroleum refining, electricity generating stations, coal carbonization works, ironworks, steelworks, ceramic works, and fluorine emitting processes.

21865 APTIC NO. 40398

Dreyhaupt, Franz Josef

AIR POLLUTION CONTROL AND PLANNING. *(Immissionsschutz und Planung). Text in German. Luftverunreinigung, 1971:4-9, Dec. 1971. 9 refs. (Presented at the Provincial Council for Pollution Control of the North Rhine-Westphalia Province, Dortmund, West Germany, April 29, 1971.)*

Pollution control problems involved in city and regional planning are discussed. While data on emission sources should be available when planning residential and industrial areas, long-term consequences of specific decisions are hardly predictable. The distance from emission sources, dominant wind direction, the need for green zones, traffic planning and long-distance heating are factors of primary importance in planning residential and industrial areas. When determining the distances between residential areas and industrial plants, the dominant wind directions, wind speed, wind frequency and atmospheric stability should be taken into account. Green zones are necessary as they cause both vertical and horizontal air exchanges, and forests act as dust filters. Measures for abating air pollution due to traffic, to be considered in traffic planning, are suggested. While new residential areas should be based on long-distance heating, electric or gas heating should be installed in existing homes. Thus, both sulfur dioxide and dust emissions could be reduced by 20 to 30 times, and even more, for carcinogenic emissions.

21866 APTIC NO. 40517

Eddy, Amos

REMOTE MANAGEMENT OF HUMAN ORIENTED ECO-SYSTEMS. *Oklahoma Univ., Norman, Proc. Air Pollut., Turbul. Diffus. Symp., Las Cruces, N. Mex., 1971, 5p. (Dec. 7-10.)*

If the human race is to survive it must develop the ability to estimate the consequences of the instability-producing actions it is able to take as a result of its powerful technology. A carefully constructed computer model of the world ecosystem can provide a tool for estimating these consequences. Such a model can be made to separate signal from noise given any input data set, and to suggest which could be the most fruitful data gathering expeditions to launch to ungrade predictive capabilities. The model is a resident on a central computer and accessible through a nation-wide network. Remote input/output devices would enable the scientists, planners, and decision makers of the nation to upgrade submodels, test new ideas, and introduce new data as desired. The system is well within the present state-of-the-art and to be capable of paying its own way within a few years of its inception. A currently running prototype is discussed. (Author abstract modified)

21867 APTIC NO. 39905

Faith, W. L.

AIR POLLUTION CONTROL. MANPOWER NEEDS IN THE PRIVATE SECTOR. *National Air Pollution Control Administration Contract 22-69-54, 73p., May 15, 1969.*

It is estimated that the Air Quality Act of 1967 will require 15,000 additional man-years to the 20,000 man-years now assigned for air pollution control activities. This additional manpower requirement includes 4000 man-years of professional time (chiefly engineers, chemists, and executive personnel); 4000 man-years for technicans; and at least 7,000 man-years for skilled labor in operating and maintenance. Moreover, if some of the high-labor processes of reducing sulfur dioxide in plant stacks are adopted widely, an additional requirement of 20,000 man-years of operating and maintenance labor might be required. Not included in the above figures are the engineering man-years required for the design of air pollution control equipment installations which might run as high as 600 to 750 man-years. Furthermore, the engineering manpower for designing facilities for removing SO2 from stack gases is not included. When one considers that such facilities may cost $2.50 to $25/kw plant capacity and that as much as four to five man-years of engineering may be required for design work in some cases, the strain on engineering manpower is obvious. The principle requirement for professionals is in air pollution control equipment manufacture, the electric utility industry, and the chemical industry. The major demand for additional skilled labor will be by equipment manufacturers, foundries and utilities if stack removal of SO2 becomes widespread. The supply of needed professionals will come through the colleges and universities where no specific training in air pollution control is required. Skilled labor will likewise require no more training than that already required for other industrial activities. For both of these groups, knowledge of air-pollution problems will come through work experience. For technicians, on the job training, augmented by formal education, in areas such as instrument maintenance will be necessary. Regarding specific training in air pollution science, the greatest demand in the private sector will be for intensive short-course training of corporate personnel and intermediate grade engineers to keep them current in the field. Some of the short courses now given by the National Air Pollution Control Administration and by universities appear to be suitable for the purpose.

21868 APTIC NO. 40029

Feldhaus, Gerhard

THE RIGHT TO QUIET AND CLEAN AIR. THE BASIC IDEA OF THE FEDERAL EMISSION PROTECTION LAW. *(Das Recht auf Ruhe und saubere Luft. Grundgeadanken des Bundes-Immissionsschutzgesetzes). Text in German. VDI (Ver. Deut. Ingr.) Nachr. (Berlin), 26(13):1, March 1972.*

The Bundestag of the German Federal Republic will soon begin discussion of the draft of the Federal emission protection law. This legislation will provide the legal basis for preventing a further deterioration of the quality of the atmosphere. It requires that all presently existing technical means be used to combat air pollution. The major polluters will continue to be subject to stringent inspections which will be expanded to include all non-industrial sources such as agricultural plants. A series of other regulations will help to control regional environmental problems. For heavily polluted areas the continuous measurement of toxic components of the air will be required. All important sources of air pollution including domestic heaters, industries, and automobiles will have to be included in an emission registry. The costs arising from the law will have to be carried by the polluters.

21869 APTIC NO. 40533

Fujii, Kouji

SOME CONSIDERATIONS ON THE AGREEMENT FOR THE PREVENTING PUBLIC NUISANCE. *(Kogai boshi kyotei ni kansuru ichi kento). Text in Japanese. Ube Kogyo Koto Senmon Gakko Kenkyu Hokoku (Res. Rep. Ube Tech. Coll.), no. 14:31-36, Dec. 1971. 12 refs.*

The successful case of the air pollution control agreement signed between the Yokohama Municipal government and the Japan Steel Pipe Co., and the unsuccessful case of the one signed between Shinnanyo city and Toyo Ethyl Co. are compared and commented upon. Toyo Ethyl was constructed in Shinnanyo, Yamaguchi Prefecture in 1969. After a mutual agreement was signed among Yamaguchi Prefecture, Shinnanyo city, and Toyo Ethyl Co., the plant began manufacturing tetraethyl lead. But in June 1970, the labor union of the Toyo Ethyl plant refused to continue the production and be responsible for toxic air pollution, with the backing of a strong citizens movement. In Jan. 1971, the factory was forced to terminate its operation after a little over a year since its initiation. The fact that the agreement of Yokohama succeeded and that of Shinnanyo city did not, is due to the fact that the municipal government of Yokohama and Kanagawa Prefecture based their agreement on a good control program and followed up the plans with their application. An agreement was signed irresponsibly by the prefecture, the city, and Toyo Ethyl without workable plans and ability to follow them up. Legal agreements and designation of emission standards are not enough for workable control plans; instead, an ethically based gentlemen's agreement is needed.

21870 APTIC NO. 40009

Fukaya, Morihei

PUBLIC NUISANCE CONTROL PLANS. *(Kogai boshi keikaku). Text in Japanese. Japan Environmental Sanitation Center, Tokyo, 22p., Feb. 1972.*

Public nuisance control plans for the Mizushima industrial area in Okayama Prefecture include a long term goal (1975) for achieving maintenance of less than a 0.2 ppm/hr average of sulfur oxide concentration in the air for 99% of the year, with the maximum of 0.05 ppm/hr average on any day; at any given location, the number of days exceeding maximum permissible concentration of sulfur oxides should be less than 3% of total number of days and the emergency condition should not continue more than three days at a time. With regard to suspended particles, more than 50% of total days throughout the year should have less than a 0.15 mg/N cu m/day average, and more than 95% of total days throughout the year should have a 0.3 mg/N cu m/24 hr average. Specific plans for achieving these goals in Kurashiki area (part of the Mizushima Industrial Complex) include reduction of sulfur content in stack gas by using gas fuel and low sulfur oil down to an average of 0.059%; collectivization and extension of smoke stacks; collectivization of 72.7% of the total sulfur oxide emissions of the area to 11 (existing and planned) stacks that are higher than 150 m; desulfurization plans for stack gas; an increase of the number of dust collectors from the present 20 to 40; installation of automatic odor detectors in factories; an various leakage prevention plans.

21871 APTIC NO. 40351

Genscher, Hans-Dietrich

IMMISSION PROTECTION ON THE FEDERAL LEVEL. *(Immissionsschutz auf Bundesebene). Text in German. Tech. Umweltmag., no. 2:24-25, April 1972.*

The federal emission protection law drafted in the Federal Republic of Germany makes the polluter responsible for cleaning the environment. Smaller enterprises that had not previously been subject to Federal licensing will now be included under the new legislation. Non-compliance will be a criminal offense with punishments of up to 10 yrs in prison and a fine of up to about $31,000. The new law promotes preventive measures such as clean manufacturing processes. State authorities are requested to continuously monitor air pollution.

21872 APTIC NO. 39842

German, Ralph H.

PROBLEMS OF COMPLIANCE WITH AIR POLLUTION ORDINANCES IN ALLEGHENY COUNTY, PENNSYLVANIA. *Interdepartmental Committee on Air Pollution, Washington, D. C., Air Pollut., Proc. U. S. Tech. Conf., Washington, D. C., 1950, p. 695-701. 26 refs. (May 3-5, Louis C. McCabe, ed.)*

The beginnings of statutory regulations of air pollution in Pittsburgh go back to 1895 when the forerunner of the present Pittsburgh smoke ordinance was passed. It was shortlived, being held invalid as an unreasonable exercise of the police power, since it prohibited the emission of all smoke from bituminous coal for longer than three minutes at any one time. Another smoke ordinance was invalidated in 1911, and in 1917 an ordinance was passed which substituted the Ringelmann chart as a density-measuring gage for the nebulous prohibition against smoke or dense smoke. The present Pittsburgh ordinance is modeled largely on the St. Louis ordinance and it is based on the principles that fuel users who wish to burn high-volatile coal must employ mechanical equipment to burn it smokelessly, and if mechanical fuel-burning equipment is not used, fuel users must then burn a smokeless fuel. Some of the salient sections of this ordinance are summarized. Recently Allegheny County has enacted a carefully drafted smoke control ordinance that differs in some material respects from the Pittsburgh ordinance. The question concerning a number of fuel users now is whether or not the county ordinance will supersede those of the city. Possible conflict between air pollution ordinances is discussed.

21873 APTIC NO. 40240

Ginjaar, L.

ENVIRONMENTAL POLLUTION CALLS FOR MULTIDISCIPLINARY PREVENTIVE AND PROTECTIVE MEASURES. *(Een staalkaart van de milieuvervuiling). Text in Dutch. TNO Nieuws, 26(6):349-355, June 1971.*

Some general features of past and present human experience with air and water pollution are discussed. In an analysis of the pertinent problems, the adequacy of certain protective means is evaluated. In this context, such terms as: best practicable means, natural resources management, and environmental quality standards are elucidated. The necessity of international cooperation in preventing and fighting environmental pollution is emphasized; three types of criteria are suggested. Whereas environmental control is by definition associated with many aspects common to public health, economics, science, engineering, and town or district planning, a properly coordinated multi-disciplinary approach is a must for present and future generations of policy-makers. (Author abstract modified)

21874 APTIC NO. 40570

Gray, Albert Woodruff

WHY COURTS SAID NO TO COMMERCE OIL. *Petrol. Refiner, 38(8):190, 192, 194, 197-198, 203-204, Aug. 1959. 6 refs.*

Opposition to the construction of a petroleum refinery by the residents of Jamestown, R. I., came recently for determination before the U. S. District Court in that state. Plans of Commerce Oil were for the refining of 43,000 barrels of Kuwait crude oil daily, a sour crude with a sulfur content of about 2.5%. When banning Commerce Oil from building the refinery on the grounds that it was nuisance, the court pointed out that the minimal quantity of sulfur dioxide to be discharged each day would be 37 tons. However, SO2 is detectable in a concentration of 2.5 ppm in the atmosphere and in concentrations of more than 5 ppm, has an irritating effect upon the nose, throat, and eyes. In addition, it appeared in the progress of this litigation that water from Narragansett Bay would be used for cooling refinery units, amounting daily to at least 100 million gallons which, after circulating through the heat exchangers, would be discharged into the Bay. Previous cases similar to this one are cited, and the question of what constitutes a nuisance is considered.

21875 APTIC NO. 40942

Green, Cecil H.

PROTECTING AND IMPROVING OUR ENVIRONMENT -- AN ENGINEERING CHALLENGE. *Mines Mag. (Denver), 62(5):13-16, May 1972. (Presented at Engineers Day, Annual, 38th, Golden, Colo., 1972.)*

There are both technological and human motivational factors involved in the degree of environmental control desired, as well as in the associated time scale for its implementation. One of the most immediate challenges is to define a system of priorities that will balance the application of existing and new technologies against current public acceptance of added costs. Specifically, the challenge for engineers of today and tomorrow is to accelerate the application of available mechanisms and technologies innovatively and, of course, in a cost-effective way. Public concern, government programs, and industrial research activities pertaining to environmental protection are mentioned. Control programs at Texas Instruments are discussed.

21876 APTIC NO. 39847

Hansen, Richard F.

STATUTORY REGULATION OF AIR POLLUTION: AN APPRAISAL OF EXISTING LAWS AND PROPOSALS FOR FUTURE LAWS. *Interdepartmental Committee on Air Pollution, Washington, D. C., Air Pollut., Proc. U. S. Tech. Conf., Washington, D. C., 1950, p. 732-746. 50 refs. (May 3-5, Louis C. McCabe, ed.)*

Although air pollution in this country is a nuisance which should be reduced to a minimum, there is no justification for concluding that all pollution, or even a major part of it, is a serious threat of life or comfort to be eradicated immediately at any cost. The necessary scientific know-how to remove all, or even a substantial part, of the industrial pollutants from the air without disrupting business simply does not exist. However, the hour has arrived for essential research to determine the direct and indirect effects of various contaminants on health. Air pollution is essentially a local problem, and the need for its abatement or control varies from one community to another. The laws of California and Pennsylvania at the time of smog occurrences are examined in order to determine whether or not they would have been adequate to have prevented the smog, has they been enforced. Other state laws, municipal and county ordinances, and suggestions as to future laws are considered. Objections to the permit or license system are raised.

21877 APTIC NO. 40042

Heers, Franz-Wilhelm

ENVIRONMENTAL PROTECTION IN THE LAW - LEGAL REGULATIONS CONCERNING THE MAINTENANCE OF CLEAN AIR. *(Umweltschutz im Recht - gesetzliche Bestimmungen zur Reinhaltung der Luft). Text in German. Gas Wasserfach, Gas Erdgas (Munich), 113(1):16-19, Jan. 1972.*

The states of Baden-Wuerttemberg, Bavaria, Lower Saxony, North Rhine Westphalia, and Rhineland Palatinate have emission protection laws which demand the limitation or the total halt of operation of plants whose emissions are a threat to life or health or which damage material goods. The general police law which exists in these states and in all the other states of the Federal Republic of Germany is discussed. Smaller plants are subject to the trade regulations which demand a halt of any operation of plants emitting toxic substances or request the installation of cleaning systems. The state planning law only weakly contributes to the maintenance of clean air. The building code, however, is an important instrument which can be used to combat air pollution.

21878 APTIC NO. 40544

Hendriks, Robert V.

NEW DEVELOPMENTS IN AIR POLLUTION LEGISLATION AFFECTING THE PAPER- CONVERTING INDUSTRIES. *Preprint, Technical Assoc. of the Pulp and Paper Industry, New York, 8p., 1971. (Presented at the Technical Association of the Pulp and Paper Industry Plastics Paper Conference, Chicago, Ill., Sept. 15, 1971.)*

Since the start of federal government involvement in air pollution control in 1955 when Congress passed legislation authorizing a federal program of research and technical assistance, there has been a fairly steady trend of increased government involvement in pollution control programs, culminating with the Clean Air Act of 1970. One of the new features of the act was the establishment of new source performance standards. The federal government has been given the responsibility of categorizing important stationary sources of air pollution and setting national emission standards that all proposed new or modified facilities will have to meet. The government is also authorized to set national air quality standards for pollutants having any known adverse effects. Standards have been set for sulfur dioxide, particulates, carbon monoxide, hydrocarbons, nitrogen dioxide, and photochemical oxidants. Standards are being formulated for asbestos, mercury, and beryllium. The air quality standard which most immediately affects the paper-converting industry is the limit on hydrocarbons at 160 micrograms/cu m. A government-industry cooperative study investigated a number of possible control techniques. The processes with the greatest air pollution potential are lithography and metal decorating. The existing technology of small fixed-bed sorbent and catalytic combustion package devices for hydrocarbon pollution control from small emission source industries was also evaluated. Possibilities for meeting new emissions standards include changing the coating and printing make-up to solvent-free or low-solvent formulation, changing process operations, and using various types of control equipment such as incinerators, adsorbers, and scrubbers.

21879 APTIC NO. 39849

Hofflund, John L.

NATIONAL ASPECTS OF AIR POLLUTION LEGISLATION. *Interdepartmental Committee on Air Pollution, Washington, D. C., Air Pollut., Proc. U. S. Tech. Conf., Washington, D. C., 1950, p. 765-772. 4 refs. (May 3-5, Louis C. McCabe, ed.)*

The pollution of air from industry and other sources falls within the broad legal category of tort and the narrower classification of public nuisance, but legislation in these fields is generally conceived of as local in character and as proper subjects for state laws and municipal ordinances. However, cases already determined and now pending show that the problem does have international aspects, and the legal problems involved in air pollution already transcend the legislative power of mere political subdivisions. Two cases which concern the United States and Canada are mentioned. In spite of the absence of any current movement to inject the Federal Government into the field of regulation and control of air pollution, the Constitutional problems such action would involve are discussed. Tax relief and other actions the Federal Government could take as an aid to the pollution problem are cited. The states can and in many cases will probably find it necessary to enter into compacts among themselves for the control of air pollution.

21880 APTIC NO. 39994

Howlett, Bruce E.

ENVIRONMENTAL PLANNING FOR THE ELECTRIC UTILITY INDUSTRY. *Pub. Util. Fortn., 89(9):35-37, April 27, 1972.*

Popular concern for the environment and the planning and siting activities of electric utilities are discussed. Transmission lines and power plants must consider land use (residential, commercial, industrial, parks), topography, natural resources, cultural and social values, visibility and visual quality, land ownership and land value, and future land development. Technically, each of these topics can be studied and taken into account whenever new alignments are under study. Selection of the type and detail of environmental information required will depend to a large degree on the nature of the territory through which the lines must pass: urban, suburban, or rural. Depending on the circumstances, an alignment selected for the minimum cost, could also have a maximum environmental impact, which should be avoided.

21881 APTIC NO. 40549

Infeld, Donald and Gregory Wilcox

GOVERNMENTAL APPROACHES TO AUTOMOBILE AIR POLLUTION CONTROL. *Inst. of Public Administration, Washington, D. C., Office of Air Programs Contract EHS 70-126, Rept. APTD-0766, 140p., Aug. 1, 1971. 121 refs.*

NTIS: PB 203952

If public control policy is to guarantee a reduction in the social cost of air pollution it must manipulate or control average emission/vehicle/mi and miles, and location of use. Average emissions and miles of use are used to calculate the magnitude of air pollution. The location is an essential determinant of the actual damage produced. Three basic targets for government measures are automotive industries, motor vehicle owners, and usage patterns. Congress establishment of standards on the sole basis of perceived public health and welfare needs represents a substantial departure from previous legislation which required appropriate consideration of technological feasibility and economic costs. The failure of production line vehicles to perform as well as their prototypes has serious implications for air quality. In addition, the consumer expenditures since 1968 were substantially worthless. The application or modification of antitrust laws is possibly the major recourse in law to control auto emissions. Warranties are seen as a means of stimulating the auto industry to develop durable exhaust pollution systems. Federal planning of integrated mass transit policies and the modification of the urban environment are methods of separating people from high pollution concentrations. (Author abstract modified)

21882 APTIC NO. 40563

Jenkins, Vance N.

THE PETROLEUM INDUSTRY SPONSORS AIR POLLUTION RESEARCH. *Air Repair, 3(3):144-149, Feb. 1954.*

The organization and activities of a broad American Petroleum Institute pollution prevention program, initiated in the 1920s, are described. One project undertaken was to determine what substances composed Los Angeles smog, to what extent the refining industry was responsible for it, and what steps would have to be taken by the industry to reduce its contribution to it. Results are considered, as well as the theory that the reduction in visibility, eye irritation, and crop damage are due to the reaction of ozone with olefinic hydrocarbons. Other projects are mentioned, including measures planned. The modified Claus process is cited.

21883 APTIC NO. 39805

Johnson, Ligon

HISTORY AND LEGAL PHASES OF THE SMELTING-SMOKE PROBLEM--I. *Eng. Mining J., 103(20):877-880, May 19, 1917. (Presented at the American Institute of Mining Engineers, New York, N. Y., Jan. 26, 1917 and the American Institute of Mining Engineers, St. Louis, Mo., Oct. 1917.)*

Smoke troubles began to bother the Roman smelters in the Iberian Peninsula shortly before the Christian era. Nowadays German smelting is, or at least was, prior to war conditions, under supervision of special officials in the nature of mining police and courts. Before construction of a smeltery could be begun, application for a permit had to be made, accompanied by general data as to situation, character, capacity, height of stack, character of ore to be treated and the like. Although the British Alkali Act was not originally aimed at smelters, it was later amplified to apply to them. The effect of fumes from heap roasting is discussed. The first development to obviate smoke effects went to long settling flues, smokehouses, and dust chambers, cooling and slowing gases, and removing the solids and acid vapors. Smeltery trouble near forest preserves and the Selby litigation between Benecia residents and the Selby plant in California are discussed.

21884 APTIC NO. 40226

Kennedy, Allen S., Alan S. Cohen, E. J. Croke, K. G. Croke, J. Stork, and A. P. Hurter

AIR POLLUTION-LAND USE PLANNING PROJECT. PHASE I. (FINAL REPORT). *Argonne National Lab., Ill., Center for Environmental Studies, and Northwestern Univ., Evanston, Ill, Dept of Industrial Engineering and Management Sciences, Office of Air Programs Contract, 153p., Nov. 1971. 12 refs.*

NTIS: ANL/ES-7

Methods and procedures used to assess the air pollution potential of land-use plans are examined with respect to a land-use computer submodule of the Air Quality Display Model System. The submodule was tested using data from the Chicago Air Quality Control region and a procedure for evaluating land-use-based emission density regulations was provided based on zoning land use or economic activity. Tables correlating zoning class, i.e., heavy or light industiral, residential, or commercial areas, with sulfur dioxide emissions are presented. Total emissions also included calculations of particulate, nitrogen oxide, hydrocarbon, and carbon monoxide measurements. Techniques for projecting land-use-based emission inventories with the dispersion model are examined. The development of land-use-based air pollution control policies, through point source controls, emission density regulations, zoning, or governmental inducement, and the administrative mechanisms of locational air pollution control policies, including taxations, subsidization, public investment, or direct control are discussed. Computer programs, mapping details, and techniques for applying the plan to actual conditions are included.

21885 APTIC NO. 39843

Kennedy, Harold W.

THE LEGAL ASPECTS OF THE CALIFORNIA AIR POLLUTION CONTROL ACT. *Interdepartmental Committee on Air Pollution, Washington, D. C., Air Pollut., Proc U. S. Tech Conf., Washington, D. C., 1950, p. 702-711. 70 refs. (May 3-5, Louis C. McCabe, ed.)*

There have been many smoke nuisance cases in California as well as in the other states. Where the suit is brought by a private individual to abate a private nuisance, some courts have balanced the equities and have refused to close a large factory because of the nuisance to a few residents in the neighborhood. Under the nuisance provisions of the law, there is no legal basis for supervision, research, education, or coordination of enforcement activity. Although the police power of the state can deal with air pollution problems, a modern statute with a simple, objective standard is required. California has adopted such a statute, which also authorizes local rules and regulations having the force of law. The Act forbids the discharge into the atmosphere of any emission as dark as or darker than that designated as no. 2 on the Ringelmann chart for more than three minutes in any one hour. Immediately after the Act became effective, an air pollution control district was activated in Los Angeles County and rules and regulations were adopted.

21886 APTIC NO. 40028

Koehler, R.

ENVIRONMENTAL PROBLEMS IN THE GERMAN DEMOCRATIC REPUBLIC. PILES OF REFUSE, WATER AND AIR POLLUTION ALSO UNDER SOCIALISM. *(Umweltprobleme in der DDR. Abfallberge, Wasser- und Luftverschmutzung auch im Sozialismus). Text in German. VDI (Ver. Deut. Ingr.) Nachr. (Berlin), 26(17):6, April 1972.*

The German Democratic Republic uses soft coal for 75% of its electric power and heat production. The primary desulfurization of fuel oil and natural gas has been technically solved but the desulfurization of soft coal is still financially impractical. Several regulations have been enacted in order to stem environmental pollution, and the coordination of control efforts by the various states has been encouraged. In the industrial area of Leipzig-Borna-Altenburg a narrow measurement grid exists for the exact analyses of dust and sulfur dioxide. In the vicinity of the petrochemical plant Schwedt/Oder, 28 air sampling stations were erected.

21887 APTIC NO. 40126

Lewicke, Carol Knapp

NEXT FEDERAL CLEAN UP TARGET: AIRCRAFT NOISE AND EMISSIONS. *Environ. Sci. Technol., 6(3):220-222, March 1972. 1 ref.*

The passage of the Aircraft Noise Abatement Act and The Clean Air Act of 1970 has prompted the aircraft industries to produce quieter planes with fewer emissions. Noise and sonic boom generation are under the regulation of the Federal Aviation Administration, while the Environmental Protection Agency has been empowered to set emission standards. Regarding noise output, the new generation of jumbo jets does in fact meet the present F.A.A. noise certification standards. However, the noisier, older generation turbofan-powered aircraft are responsible for 85% of the flights in the U. S. Commercial planes are known to emit carbon monoxide, unburned and partially oxidized hydrocarbons, nitrogen oxides, and particulate matter. Presently, aircraft emissions represent 3.3% of all sources. Proposed emission standards for aircraft are designed to be implemented into the existing framework of F.A.A. certification procedures. A smoke control retrofit program, scheduled for completion by the end of 1972, will eventually affect 31 airlines. This smoke retrofit process also reduces carbon monoxide, hydrocarbons, and particulate emissions. Nitrogen oxides remain at the same or slightly increased levels. The major problem anticipated with the bigger engines of the future is that of nitrogen oxides emission.

21888 APTIC NO. 40562

Long, Norton E.

NEW TASKS FOR ALL LEVELS OF GOVERNMENT. *In: Environmental Quality in a Growing Economy. Henry Jarrett (ed.), Baltimore, Johns Hopkins Press, 1966, p. 141-155.*

The governmental structure of the United States is changing in such a way that the diversity of environmental values will receive more effective representation in the decision-making structure of government. A major federal function is the activation of local groups whose existence makes possible the realistic political enterprise of pressing for needed public goods that are undevaluated or not valued at all. Indicators of environmental quality need to be built into the national public reporting system at the Presidential level. This would be a major policy and institutional change. As the jurisdiction that includes all others, the federal government internalizes the costs of ills of environmental quality and benefits from their removal. A major force working against restructuring local governments into regional patterns whose resources and territories would be more adequate to achieve control of the quality of the physical environment is the deeprooted desire to maintain inequalities in the human environment. Those who would control the physical quality of the environment, and air and water pollution are fearful of the further political consequences of creating institutions of the power and comprehensiveness requisite to the job. A further problem for the improvement of environmental quality beyond the conflict over politics of redistribution stems from the capabilities and motivations of local governments and their inhabitants.

21889 APTIC NO. 40753

Meshenberg, Michael J.

ENVIRONMENTAL PLANNING: 1. ENVIRONMENTAL INFORMATION FOR POLICY FORMULATION. *American Society of Planning Officials, Chicago, Ill., Rept. 263, 55p., Nov. 1970. 101 refs.*

Reliable information about the environmental resource base should be collected on an areawide basis on a sufficiently detailed level to be useful for municipal and specific project planning. The main purpose of such an analysis would be to determine the capacity of an area to absorb development and to determine which areas should not be developed at all. Resources need to be viewed as dynamic and interrelated processes. Usually the ecological data are presented on suitability maps. Both natural and cultural ecological data must be objectively collated and an understanding of the natural processes intergrated with this knowledge to ensure intelligent land use. A chart is included which provides a framework for systematically analyzing the data from an environmental inventory for use in developing a plan.

21890 APTIC NO. 40111

Munns, J. J.

THE WEIRTON AIR POLLUTION PROGRAM. *Air Repair, 3(3):170-172, Feb. 1954.*

In response to public concern over air pollution, a community survey was undertaken by a West Virginia steel plant to obtain dustfall and gas data as well as wind conditions. An extensive stack sampling program was conducted within the mill area. Based on the survey findings, the company's engineering department has begun taking action, in terms of prevention and the provision for the installation of control equipment in the building layout of new installations. Public relations are considered. Survey data are presented on wind conditions and on the relative contribution to emissions by the major plant operations.

21891 APTIC NO. 40045

Nakano, Michio

AIR POLLUTION OF OSAKA CITY: ITS TRANSITION AND STATUS QUO. *(Osaka no taikiosen: sono suii to genjyo). Text in Japanese. Rodo no Kagaku (Dig. Sci. Labor), 27(2/3):38-60, March 1972. 2 refs.*

Consumption of fuel oil and fluctuation of sulfur dioxide gases emitted by oil burning are discussed. Levels of air pollution by sulfur oxides, suspended particulate matter, and dust fall and their fluctuations in recent years were explained. The Blue Sky Project was set up to decrease SOx in Osaka and Sakai cities. The 106 factories which consumed more than 10 kl fuel oil/day are the objects of the first plan of this project. The second plan aims to decrease SOx exhausted from heating facilities for buildings, and the third makes small and middle size pollution sources the object of control. A clean air plan was set up Aug. 1971 as another method to decrease not only SOx but other pollutants in Osaka City.

21892 APTIC NO. 40058

Nose, Yoshikatsu

RESULTS OF COUNTERMEASURE OF AIR POLLUTION IN THE CITY FOR 20 YEARS AND ITS FUTURE PROBLEMS. *(Ube-shi no taikiosen taisaku 20 kanen no seika to kongo no mondai). Text in Japanese. Rodo no Kagaku (Dig. Sci. Labor), 27(2/3):66-75, March 1972. 8 refs.*

The amount of dust fall in Ube City for the past 20 years (from 1950 to 1970) has decreased since 1962 because the fuel has changed from coal to oil and dust collecting apparatus has been introduced. Compared with air pollution during the period from 1955 to 1969, the level of pollution in other industrial cities has not been decreasing as rapidly as that in Ube City. In many cities, sulfur dioxide levels have been increasing while amount of dust fall has been decreasing, but the concentration of SO2 has not been increasing in Ube City. As a result of the introduction of dust collecting apparatus in the industries, bronchitis mortality has been significantly reduced and asthma and heart disease mortalities decreased. In Ube City, the countermeasure against air pollution had been favorably pushed foward before 1968. But smog warnings were announced 8 times in 1969, 12 times in 1970, and 11 times in 1971. As a countermeasure against smog and air pollution, construction of tall chimneys has been positively carried out. Environmental criterion of SO2 was reduced from 0.05 ppm to 0.035 ppm by an agreement with industries. City planning, such as paving and planting roadside trees, also has been promoted.

21893 APTIC NO. 39802

Roberts, E. F.

THE RIGHT TO A DECENT ENVIRONMENT: PROGRESS ALONG A CONSTITUTIONAL AVENUE. *In: Law and the Environment. Malcolm F. Baldwin and James K. Page, Jr. (eds.), New York, Walker and Co., 1970, p. 134-165. 72 refs.*

Precedents in U. S. litigation are cited to support the contention that the right to a decent environment has a clear basis in constitutional law. Recent decisions in nuisance cases, which can be seen as a judicial form of land use zoning, suggest a possible increase in judicial sensitivity to the character of neighborhoods. Questions of economic and political philosophy are considered. Various amendments to both the Federal and state constitutions have been drafted relative to the right to environment, and the intellectual environment is now propitious in which to promulgate new doctrine. The constitutional approach is advocated because the Supreme Court has been the device by which questions of fundamental structure have been resolved in the U. S.

21894 APTIC NO. 40234

Ross, Steven S.

FEDERAL LAWS AND REGULATIONS. *Chem. Eng. Deskbook, 79(10):9-12, May 8, 1972.*

Under the 1970 Clean Air Act amendments, the Environmental Protection Agency (EPA) sets air quality standards for the states to enforce. These include ambient air standards for six major pollutants, emission standards for five classes of new plants, and standards for asbestos, beryllium, and mercury. States must set limits on existing sources and regulate fuel sulfur content and automobile use so that federal standards are met by 1975. Automobile pollutants are such a problem that many states are asking for a two year extension of the 1975 deadline. The EPA is preparing criteria documents for polynuclear organics, arsenic, cadmium, chromium, manganese, nickel, vanadium, and polychlorinated biphenyls. Standards are expected this year for new sewage sludge incinerators, fertilizer plants, small industrial steam power plants and boilers, rendering plants, asphalt batching facilities, iron and steel smelters, mills and smelters for non-ferrous metals, especially brass, bronze, and secondary lead.

21895 APTIC NO. 40083

Seidl, W.

INTERNATIONAL CO-OPERATION IN DOCUMENTATION AND TERMINOLOGY IN THE FIELD OF AIR POLLUTION. *International Union of Air Pollution Prevention Associations, Intern. Clean Air Congr. Proc., London, England, 1966, p. 287-291. (Oct. 4-7, Paper VII51/10.)*

The extent and structure of the literature dealing with air pollution are reviewed. The explosion of sciences and the delimitation of the scope must be considered. Essentially, only the conventional, non-radioactive contaminations arising in the open air should be treated in toto. The literature concerning this sphere shows the same tendencies: the current increase of the number of publications and the periodicals in which they appear as well as the progressive linguistic differentiation. A statistical investigation allows the appraisal of the various national productions, their distributions to subjects, and their rate of growth. A collaboration to commence with analyses of national publications is suggested.

21896 APTIC NO. 40747

Senew, Michael J.

THE MANPOWER DEMAND FOR TECHNICAL PROFESSIONALS IN AIR POLLUTION CONTROL. *Preprint, Office of Air Programs, Research Triangle Park, N. C. Office of Manpower Development, Operations Research Society of America, Baltimore, Md., 13p., 1971, 4 refs. (Presented at the Operations Research Society of America, National Meeting, 40th, Anaheim, Calif., Oct. 25-29, 1971.)*

To obtain the skills needed to solve the problems in air pollution, it is necessary to hire personnel already trained to hire unskilled personnel and train them, and to hire semi-skilled individuals and upgrade their training. The problems are different for different employers in the Federal, private, state, and local sectors. Little difficulty has been encountered in filling Federal positions. The Office of Air Programs indicates increased staffing from 1141 positions in 1971 to over 2900 positions by 1974. There are 20,000 man years now assigned to air pollution activities in the private sector. There will be a need for 14,000 more to meet Federal, state, and local regulations now being implemented. The greatest demand in the private sector will be for short course training of existing personnel. A recent manpower inventory of state and local air pollution control agencies shows that 45% are professionals. The demand for more technical professionals is expected to be strongest at the state and local level. Within the next year, about 1100 new jobs will be created. A 5% attrition rate among present employees, plus 436 existing budgeted unfilled positions plus new jobs should make about 1706 new openings available. Of these, 36% will be for technical professionals.

21897 APTIC NO. 39943

Shy, Carl M., John F. Finklea, Dorothy C. Calafiore, Ferris Benson, William Nelson, and Vann A. Newill

A PROGRAM OF COMMUNITY HEALTH AND ENVIRONMENTAL SURVEILLANCE STUDIES (CHESS). *Office of Air Programs, Research Triangle Park, N. C., Community Research Branch, 9p., May 4, 1971.*

A program is described that will attempt to relate community health to changing environomental quality by making a continuing series of epidemiological studies in selected communities. The communities are selected to provide an exposure gradient for the most common air pollutants. The studies involve monitoring air pollutants and simultaneously studying health indicators known to be sensitive to variations in air quality. The program is currently in operation in three areas with three more planned or under development. The plan is to last five years and will show the health benefits of air pollution control.

21898 APTIC NO. 40788

Smith, Jack

COAST S LARGEST STEEL PLANT KEEPS AIR CLEAN. *Air Eng., 1(9):31-34, Dec. 1959.*

By July 1957, following months of research, all nine open hearth stacks at a southern California steel plant were controlled by nine Cottrell electrostatic precipitators at a total cost of $5,500,000. The two rotary car dumpers, used at the plant, one for coal and one for iron ore, were equipped with spray systems. A detergent was added to the water used in the spray system to provide adequate wetting of coal dust. A baghouse was installed in a new hammer mill building in the coal handling area where coal for making coke is broken up into small particles before charging into the coke ovens. Employees are paid a premium for keeping the coke ovens from smoking, while photographers from the air control and research department make frequent trips to the ovens to check for smoke. Screw latch doors, rotary table larry cards, dust catchers, gas washers, wet type precipitators, mist eliminators, and acid traps were installed at various operations. At the sinter plant, technicians are in the process of gathering engineering and design information by testing of pilot models under actual conditions. Organization of the air control and research program is discussed, as well as the plant fumigation program and eudcational public relations.

21899 APTIC NO. 39968

Smith, J. H. and G. L. Rounds

AIR CONTROL AND RESEARCH PROGRAM OF THE KAISER STEEL CORP. *Air Repair, 4(4):185-187, 209, Feb. 1955.*

Although there was no legislation in California pertaining to air pollution 11 years ago, all practicable air pollution control equipment and procedures were included in the original design of a southern California steel plant. The sinter plant stack was built 300 ft tall, and the open hearth stacks were built higher than was customary to gain better dispersion of the effluents. The blast furnace was equipped with a system consisting of a dust catcher, a gas washer, and a Cottrell precipitator. Coke ovens were equipped with self sealing doors and a rigid practice [illegible] established to insure their working to their greatest efficiency. Coke oven gas, used as fuel, was desulfurized. Baghouses and dust catchers were designed into the raw materials system. The railroad was dieselized. Dustfall measurements, particle size determinations, atmospheric phenomena, and vegetation projects are described, as well as public relations.

21900 APTIC NO. 40048

Steincke, Heinz

ENVIRONMENTAL PROTECTION IN THE COMMUNAL ECONOMY. *(Umweltschutz in der kommunalen Wirtschaft). Text in German. Gas Wasserfach, Gas Erdgas (Munich), 113(1):28-30, Jan. 1972.*

The chemical industry spent 1 billion dollars from 1960 to 1970 for the protection of the environment. For the period 1971 to 1974 the investments are expected to equal almost the same amount. The investments by national economy for the maintenance of clean air alone have been high. Despite all this, the air in industrial centers has not become much cleaner. Industrial pollution of the air amounts to 30% of the total pollution. While subject to control by the federal government, pollution by the individual households also contributes 30% to the total air pollution. State governments also act regarding pollution.

21901 APTIC NO. 39841

Stern, Arthur C.

PROBLEMS IN THE DRAFTING AND ADMINISTRATION OF AIR POLLUTION CONTROL LEGISLATION. *Interdepartmental Committee on Air Pollution, Washington, D. C., Air Pollut., Proc. U. S. Tech. Conf., Washington, D. C., 1950, p. 685-694. (May 3-5, Louis C. McCabe, ed.)*

Most jurisdictions have basic police powers adequate to abate atmospheric nuisances originating within their own boundaries. They principally need legislative specification as to which governmental unit of the jurisdiction is to exercise these powers as well as legislation to safeguard them from pollution originating outside their boundaries. Legislation should be specifically adapted to local problems rather than being copies of so-called model ordinances. Control depends more on competent administration than adequate legislation. The air pollution problem of a city or a county depends first on the kind and quantity of fuel burned for heating, power, and industrial processes; secondly, on the nature of its industries; and lastly, on the topographic and meteorologic features of the city. Smoke emission standards, use of the Ringelmann Chart as a standard, emission limits for large particles, dust emission, standards, weight emitted per unit time as a standard, gas emission standards, control of pollution sources, and sealing of equipment are discussed. Delegation of rule-making power, boards and administrative officers, the need for federal legislation, interstate and international pollution problems, intercounty and intercity problems, city and county problems, patterns of local administration, and the choice of administrative unit are considered.

21902 APTIC NO. 39937

Sussman, Victor H.

NEW PRIORITIES IN AIR POLLUTION CONTROL. *Pennsylvania State Univ., University Park, Center for Air Environment Studies, Proc. Conf. Air Pollution Control Eng. Aspects, Annu., Allentown, Pa., 1971, p. 45-62. 2 refs.*

The Air Resources Management system established under the Air Quality Act of 1967 was unworkable because (1) designated Air Quality Control regions were too large to be considered air basins or areas of uniform problems; (2) ambient air quality standards close to background were adopted by many states after public hearings; and (3) diffusion modeling was used to relate ambient standards to emission standards. Under the more practical Clean Air Act Amendments of 1970, states need not base control activities on arbitrarily defined regions. Instead, attention will be given to local air basin and interstate problems. The 1970 Act also provides for the Environmental Protection Agency to issue ambient air quality standards for Federal emission standards based on the best available control technology. The states can thus concentrate on more productive activities such as development of more realistic emission standards, the standardization of air sampling systems, and the application of land use and waste management techniques to air pollution control. The text of the 1970 amendments is included.

21903 APTIC NO. 40748

Thoem, Terry L.

THE FEDERAL GOVERNMENT'S ROLE IN AIR POLLUTION CONTROL. *Preprint, National Petroleum Refiners Assoc., Washington, D. C., 9p., 1971. (Presented at the National Petroleum Refiners Association, Western Regional Meeting, Casper, Wyo., Sept. 21-22, 1971, Paper WR-71-76.)*

The principal goals of the Environmental Protection Agency are the setting and enforcing of environmental standards, the conducting of research on causes, effects, and control of environmental problems, and the establishment of a program of assistance to state and local governments. The four main points in the Clean Air Act of 1970 are designed to meet these goals. The Clean Air Act provides for Federal-state cooperation in the establishment of state air pollution control programs that can meet national ambient air quality criteria. Air Quality Control Regions have been established, either intrastate or interstate, based on the local character of the problems. Primary and secondary standards for allowable concentrations of major pollutants were established. Primary standards are designed to protect public health and secondary standards are designed to promote the public welfare and protect the public from known or anticipated adverse effects of air pollutants. Regulations were written concerning the preparation, adoption and submittal of implementation plans. These plans must provide for the achievement of the ambient air quality standards in each air quality control region. Also under the Clean Air Act of 1970 are regulations for the establishment of emission standards governing major groups of stationary or process sources. These will be promulgated as necessary and feasible. Hazardous pollutants will be identified and regulations promulgated. Exhaust emission standards have been published for 1973, 74, 75, and 76 motor vehicles. The 1976 standard for oxides of nitrogen reflects a 90% emission reduction from 1971 motor vehicles.

21904 APTIC NO. 40165

Tsutsui, Mitsuo

A SUMMARY OF PRESENT REGULATIONS AND TRENDS, AND PUBLIC NUISANCE COUNTERMEASURES ON NATIONAL SCALE. *(Genko hoki no gaiyo to doko narabi ni kuni ni okeru kogai boshi taisaku). Text in Japanese. Karyoku Hatsuden (Thermoelectric Power Generation), 23(3):233-246, March 1972.*

No standard has been established for environmental pollutants except for sulfur dioxide. Measurements obtained from all over the country showed that the concentration of SO2 in large cities was decreasing, while in rural areas, which had not been applied to the regulations, it was increasing. The concentration of particulates in Tokyo decreased from 12.2 t/sq km/mo in 1968 to 9.9 t/sq km/mo in 1969. This was due to the change of fuel from coal to heavy oil. However, the concentration of nitrogen oxides increased every year. The regulations on environmental control were revised in 1971. According to the new regulations, the concentration of SO2 would be decreased 40% in 1972, and further decreased in 1973 where the values would be used as the standards and retained. Desulfurization apparatus for power plants and steel plants and the standard for nitrogen oxides were the most important subjects for future pollution control.

21905 APTIC NO. 39846

Tucker, Raymond R.

THE ST. LOUIS CODE AND ITS OPERATION. *Interdepartmental Committee on Air Pollution, Washington, D. C., Air Pollut., Proc. U. S. Tech. Conf., Washington, D. C., 1950, p. 726-731. (May 3-5, Louis C. McCabe, ed.)*

St. Louis, like many other cities, believed the air could be purified by legislation alone. After each unsuccessful attempt, a feeling of apathy descended on the community. These attempts were not successful because they either failed to realize, or saw fit to ignore, the weaknesses of all previous attempts, namely, the necessity of attacking the problem at its source. An ordinance was passed on Feb. 11, 1937, which contained the usual provisions such as the creation of a division of smoke regulation and the appointment of a commissioner. It defined dense smoke and the ash content of the fuel, created an appeal board, and outlined the method of procedure for the issuance of the necessary permits and certificates of operation for equipment. The ordinance required that all sales of fuel-burning equipment be reported to the commissioner and that definite emission standards for fly ash be met. It also prescribed penalties for violation. The section outlining the ash and sulfur specifications of fuel was the heart of the ordinance. It was claimed that the washing of coal would reduce sulfur and fly ash, produce a fuel of uniform quality with higher caloric value which would adapt itself more readily to underfeed stokers, and give a fuel with higher fusion point of ash, thus improving the fuel bed conditions and reducing clinker trouble. In this way, fuel was being controlled at the source. Enforcement of the ordinance and further ordinances to control smoke are mentioned.

21906 APTIC NO. 39844

Walker, Herbert V.

THE HEARING BOARD UNDER THE CALIFORNIA AIR POLLUTION CONTROL ACT. *Interdepartmental Committee on Air Pollution, Washington, D. C., Air Pollut., Proc. U. S. Tech. Conf., Washington, D. C., 1950, p. 712-721. (May 3-5, Louis C. McCabe, ed.)*

The California Air Pollution Control Act seeks to control air pollution by granting permits to operate existing equipment; controlling the installation of new equipment by requiring permits from the air pollution control officer; and setting emission standards. The Act provides penalties if operations result in emissions exceeding the permitted standards and authorizes the air pollution control officer to suspend an operating permit under such conditions. The hearing board functions principally in three capacities: when the air pollution control officer discovers that the holder of a permit is operating in violation of the Act, he is authorized to suspend the permit and the operator is permitted to appeal to the hearing board or the control officer may file a petition to revoke the permit and request a hearing; when the control officer denies a new permit, the applicant may appeal to the hearing board; and the hearing board, after hearing, may grant variances that allow a particular operator to operate in excess of the standard set by the Act. Some instances in which variances have been sought and granted are listed.

21907 APTIC NO. 40520

Wallden, Ingwald and Gerhard Salingen

LEAD IN PETROL. CONSEQUENCES FOR CONSUMERS AND INDUSTRY. *(Bly i bensin. Konsekvenser foer konsument och industri). Text in Swedish. Mod. Kemi., 5(4):26-31, April 1972. 9 refs.*

The viewpoints of the gasoline and the car industries concerning lead in gasoline are presented. The need for an adjustment in research and development programs is stressed. This is believed necessary to avoid incorrect investments and decisions which may restrain international trade and traffic. A new Danish thermal catalytic exhaust cleaning system with good performance at a reasonable cost is discussed. A recently introduced bill is also discussed which calls for the gradual reduction of lead in gasoline to .4 g/l by 1973 and .15 g/l before 1976. The recommendation is from the National Swedish Nature Conservancy Board and the Government Poison Board. (Author summary modified)

21908 APTIC NO. 40943

Zurn, Frank W.

FRANK ZURN. *Environ. Sci. Technol., 6(6):495-498, June 1972.*

Zurn Industries went public in 1961, acquired 18 companies during the past five years, and now has products and services in all four major environmental pollution control areas -- air, land (solid waste), water, and noise. Before the move to environmentalism, Zurn was basically a hardware oriented company, dealing in water pollution control systems only. However, Zurn customers were running into a problem with the disposal of solid waste which was entrapped in their water pollution control system. After the various air, land, and water pollution control equipment companies were acquired, it was recognized that Zurn had the hardware but not the software, which consists of research, analysis, and design feasibility. After considerable searching, Zurn came up with Ludwig Engineering and Science in late 1968, and is now capable of starting at ground zero on a pollution control problem and taking it to the ultimate solution, including training of operators, monitoring of plant effluents, and assuming total responsibility for round-the-clock performance of the plant.

SOCIAL ASPECTS

21909 APTIC NO. 40362

Chiba Prefecture (Japan), Dept of Hygiene

A SURVEY ON CITIZENS CONSCIOUSNESS OF ENVIRONMENTAL POLLUTION. *(Kenmin no kogai ishiki chosa hokokusho). Text in Japanese. 75p., July 1971.*

A survey of citizens consciousness of public nuisance was made using a questionnaire. A total of 3000 questionnaires were sent out to people between 20 and 69 years of age in five cities and three townships of Chiba prefecture, during March 20 and April 20, 1971. Of 3000 questionnaires that were mailed, only 2901 were delivered due to inaccurate addresses and 1319 replies (45.5%) were obtained. Of the total replies, 64.4% were male and 35.6% were female. Approximately 25% each belonged to age groups of 20s, 30s, and 40s, and the rest belonged to 50s and 60s. Great interest and concern over public nuisance were expressed by 96.6% of responders. With regard to the cause of serious public nuisance, 58.8% of responses felt that it was due to lack of responsibility on the part of industries; 30.1% felt that the fault lay with the government; 28.2% felt that the fault was with individuals who lacked a sense of public morality. Those who felt victimized by pollution were 59.1%, and those who were not aware of any specific individual damages were 16%. Males between 30 and 50 years of age felt especially victimized. Air pollution was the largest single source of damaging nuisance (38.2% responded); followed by noise (27.4%), and water pollution (17.4%). Seventy-seven people felt an unbearable degree of air pollution damages; 193 could withstand air pollution with some difficulty.

21910 APTIC NO. 40951

PUBLIC ACCEPTS POLLUTION AS MAJOR PROBLEM AREA. *Can. Pulp Paper Ind. (Vancouver), 25(5):30-31, May 1972.*

Since Pollution Probe was founded four years ago, the organization has grown to incorporate 50 chapters across Canada, mostly in Ontario. The aim of the group is to reduce the discharge of effluent to a level society agrees is not harmful to competing users of the air and water resources. A recent conflict has been over commercial logging in Canada's provincial and national parks. Donald A. Chant, the chairman of the board of advisors to Pollution Probe and one of the group's founding members, thinks that the pulp and paper industry does not do a very good public relations job, and that the industry has been slow in developing economic ways of recycling its products.

21911 APTIC NO. 39860

Johnson, Gerald W.

THE ALABAMA ENVIRONMENT: A SURVEY ANALYSIS. *In: Environmental Quality. A Survey of Costs, Benefits, Citizens Attitudes. Auburn Univ., Ala., Dept. of Poltical Science, p. 10-70, Oct. 1971. 6 refs.*

A total 521 Alabama residents were interviewed to determine their perception of the current state of environmental conditions, their concern over the conditions, and their willingness to pay for pollution abatement. The 20 survey sites were selected in a way allowing for a comparison between urban and rural respondents, between respondents in high and low pollution areas, and between respondents in differing socio-economic classes and races. Concern and awareness of environmental conditions were rather widely expressed. Further, an abstract willingness for government to do something about these conditions was evident. While personal willingess and expressions of specific economic commitments were less strongly stated than the abstract commitments, the majority of respondents are willing to share the cost of abatement of air and water pollution. Generally, the higher the levels of income, education, and pollution, the stronger the individual commitment to abatement. (Author summary modified)

21912 APTIC NO. 40183

Kyba, Patrick and John B. Black

THE SOURCES OF INFORMATION OF PUBLIC OFFICIALS IN ONTARIO. *Preprint, Guelph Univ. (Ontario), 57p., 1971 (?).*

A survey of elected and appointed officials in the Ontario province provided the basic data for the study. Also case studies including interviews with selected decision-makers were undertaken to provide further evidence with which to judge the validity of the conclusion suggested by the survey data. The questionnaire was designed to elicit responses to four major types of questions pertaining to: the sources of information concerning environmental pollution that reached public officials and the regard in which these sources were held, the attitudes toward pollution and pollution control prevalent among public officials in the province; the degree of involvement of Ontario s public officials in effecting solutions to specific pollution problems; and the use of information at the disposal of the officials. Those surveyed included officials elected to the federal Parliament from Ontario, the provincial Legislative Assembly, and municipal councils in various areas: and public servants at the provincial and municipal levels of government. The media was by far the most common information source among all groups, though it was not always the most influential source. Public officials were responsive to the public s concern with environmental pollution, and they made good use of the information which reached them. Sixty per cent of the officials reported involvement in pollution control at the time of the survey.

21913 APTIC NO. 40939

Sargent, Frederick, II

MAN-ENVIRONMENT -- PROBLEMS FOR PUBLIC HEALTH. *Am. J. Public Health, 62(5):628-633, May 1972. 13 refs. (Presented at the Washington State Public Health Association, Annual Meeting, 35th, Spokane, Wash., Oct. 4-6, 1970.)*

The ecosystem is a dynamic system which exhibits stability by virtue of the diversity of the organisms comprising it and adaptive capacity of these organisms to cope with environmental insults. Transformation from a natural to a human ecosystem is discussed, including environmental health and control. Managing feedback in the emerging human ecosystem is one of the most complex problems in the development of adaptive strategy. Man adapted his methods of managing wastes to the processes of the natural ecosystem, but the scale and tempo of waste production have exceeded the capacity of natural feedbacks and the toxic nature of the human detritus has disrupted the orderly functioning of the organisms in the ecosystem. Population increase and demands upon the landscape are mentioned. Criteria and standards, environmental monitoring, environmental education, and the institutionalization of environmental programs are indicated.

GENERAL

21914 APTIC NO. 39865

Hudson, Fred M.

PROGRESS REPORT, 1970-71. *In: Environmental Quality. A Survey of Costs, Benefits, Citizens Attitudes. Auburn Univ., Ala, Dept. of Civil Engineering, p. 1-9, Oct. 1971.*

The present state of air, water, and solid waste pollution in Alabama is reviewed. Municipalities with completed water treatment facilities or with advanced plans for treatment facilities are listed together with industries completing water treatment facilities or going out of business in 1970-1971. Alabama waters will be relatively free of municipal pollution by 1975, but not of 0industrial pollution. Only one of the large sources of water pollution will have completed treatment facilities before 1974. These sources contribute more than 80% of the total discharge (200 million gal/day). Twenty-two cities now have average annual particulate counts of more than 80 microgram/cu m, and the number is expected to grow as the number of monitoring stations increases. In contrast to water and air pollution, progress in solid waste disposal is impressive. Fourteen counties, containing 40% of the total state population, have complied with Alabama Legislative Act 771 by implementing acceptable disposal systems.

21915 APTIC NO. 40430

Sugawara, Ken

HUMAN SURVIVAL AND LONG-TERM ENVIRONMENTAL PROBLEMS. *(Jinrui no eizon to choki no kankyo mondai). Text in Japanese. Oyo Butsuri (Tokyo), 40(11):1168-1163, Nov. 1971.*

Protection of the environment from pollution is one of the necessary conditions for human survival. The conservation of energy and material is another. Mankind is at a point now where it is necessary to create purely artificial, recoverable organic resources in order to supplant the fast-draining natural resources. One condition in discovering such resources is that the original material be something that exists inexhaustibly today; another is that all the products from such a resource, including wastes, must be something that would be easily reduced, oxidized, and returned to the original material; and the production and recirculation must be economically feasible. Some of such materials are carbon dioxide, water nitrogen, and hydrogen. In imitation of natural chlorophyl action to a certain degree, CO2 can be reduced in catalytic water. Also, CO2 and H2 may be directly reacted in a gaseous state. Whatever the results, after this first stage of creation, the methods and processes for producing necessary things must be devised. A totally new processing must be developed under the strict condition of securing and insuring the maintenance of infinite resources. After that, waste will no longer be waste, but will become a new resource.

21916 APTIC NO. 40476

Tibaldi, Ettore

DISCUSSIONS ON THE TOPIC OF ECOLOGY. *(Divagazioni in tema di ecologia). Text in Italian. Inquinamento, 14(1):33-35, Jan.-Feb. 1972. 8 refs.*

While emissions of pollutants into the environment are often dispersed, concentration phenomena occur simultaneously which channel many pollutants into the food chain. The DDT applied on a large scale in India to control malaria can be found in marine birds in the Antarctic and in milk in New York. Modern man has strontium -90 in his bones, lead in his blood, DDT in his subcutaneous fat, tar and carcinogenic hydrocarbons in his lungs, estraneous hormones in his glands, and even tritium instead of hydrogen in cells which transmit hereditary characteristics. In the river Po in Italy, algae and fish contain cesium. The biological consequences of radioactive pollution are unpredictable. Equally unpredictable are the effects of new synthetic materials indiscriminately injected into the environment. Industrial production produces pollution which cause disease and death. Gasoline implies smog, lead, carbon monoxide, disease, and death. Advertising designed to sell gasoline distorted the true ecological message to read: gasoline plus detergent implies clean air, reduced gasoline consumption and greater mileage. In a similar manner, advertising misleads the general public on the true environmental impact of a great number of industrial products.

21917 APTIC NO. 40633

Ussar, Max

CONTRIBUTION TO THE COLLOQUIUM ON THE INFLUENCE OF INDUSTRY ON THE ENVIRONMENT.

(Gedanken zum Kolloquium ueber den Einfluss der Industrie auf die Umwelt). Text in German. Berg- Huettenmaenn. Monatsh., 116(9):303-304, Sept. 1971. (Presented at the Colloquium on the Influence of Industry on the Environment, Leoben, Austria, May 27, 1971.)

General problems of environmental protection in Austria are outlined. The elaboration of a comprehensive program for environmental protection is envisaged by the federal government. An expert team for the elaboration of different parts of the related draft was set up by the federal department for science and research, with main emphasis on actual programs rather than on high-level reforms. Industrial and urban areas as well as domestic heating in Austria have largely equal shares on air pollution, while the contributions by industry and big cities are sometimes dominant. The control of massive emissions from point sources is regarded as a problem of top priority. The disposal of residues from waste gas cleaning represents a risk of increased water pollution.

21918 APTIC NO. 39985

Vlasov, P. F., V. A. Gusev, Yu. V. Salov, and V. V. Smirnov

THERMOTECHNICAL COMPUTATIONS FOR THE DESIGN OF STACKS PROVIDED WITH VENTILATION AIR GAPS.

(Teplotekhnicheskiy raschet dymovykh trub s ventiliruyemymi vozdushnymi zazorami na ETs VM). Text in Russian. Izv. Vysshikh Uchebn. Zavedenii Energ. (Minsk), March 1971. 3 refs.

A method for the gradual computation of the thermodynamics of stacks provided with opaque wall ventilation gaps is presented. Five computer blocks are utilized. The first block includes the basic data of the stack such as its thermotechnical characteristics (heat transfer and emission coefficients, specific air and flue gas weight, gas expenditure and temperature, and parameters of the environmental air). The second block is used for computation of the approximate air expenditure occurring within the ventilation gap assuming constancy of gas temperatures throughout the height of the stack and assuming the air temperature at the gap outlet is equal to the gas temperature. The third block is used for the determination of air and gas temperatures along the constructive elements of the stack, taking into account the hydraulic resistance and the self exhaust factor for each element. Block four is used for checking the conditions determining the link between the partial hydraulic resistances. Block five serves as a final check if conditions in block four are not satisfied. If the equation concerning the partial hydraulic resistances appears to be satisfied in block five, the amount of assumed air expenditure should be decreased and computation should be decreased and computation should be repeated starting from block three. If the equation is not satisfied in block five, then the air expenditure should be increased. This procedure allows the reverse problem of determining the stack design criteria from preestablished normal operating conditions to be solved as well.

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